MathsBox

KS3 – KS4

QUESTION GENERATOR OVERVIEW

Question structures for Secondary.

Every question structure available for Secondary in the Mathsbox Question Generator, organised by topic so you can find exactly what you need.

Number | Algebra | Geometry & Measures | Statistics

2,923 question structures

337 topics

4 strands

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Secondary · 2,923 question structures

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BIDMAS

Order of operations – Positive integers 26

$a - b + c \times d$
$a + b + c \times d$
$a + b \times c$
$a - b \times c$
$a + b \div c$
$a - b \div c$
$a \times b - c \times d$
$a \times b + c \times d$
$a + (b + c) \times d$
$(a + b) \times c$
$(a - b) \times c$
$a - (b + c) \times d$
$a \times (b - c)$
$(a - b) \times c$
$(a + b) \div c$
$a \div (b + c)$
$(a - b) \div c$
$a \div (b - c)$
$a(b - c) + d$
$a(b + c) + d$
$a \times (b - c)^2$
$(a - b)^2$
$(a + b)^2$
$a \times (b - c) \times d$
MIXTURE
Mixture including decimals

Order of operations – Directed Numbers 19

$a - b + c \times d$
$a - (b + c) \times d$
$a + b + c \times d$
$a + (b + c) \times d$
$a \times (b - c)^2$
$a - b^2$
$a + b^2$
$a \times (b - c) \times d$
$a \times b - c \times d$
$a \times b + c \times d$
$(a + b) \times c$
$a \times (b - c)$
$(a - b) \times c$
$a \div (b + c)$
$a \div (b - c)$
$a + b \times c$
$a - b \times c$
$a + b \div c$
Mixture - negative numbers

Order of operations – Decimals 6

$a \times b + c$
$a + b \times c$
$a \times b - c$
$a - b \times c$
MIXTURE - Decimals
Mixture - integers and decimals

Order of operations – Fractions 25

$a - b + c \times d$
$a + b + c \times d$

Order of operations – Fractions *continued*

$a + b \times c$
$a - b \times c$
$a + b \div c$
$a - b \div c$
$a \times b - c \times d$
$a \times b + c \times d$
$a + (b + c) \times d$
$(a + b) \times c$
$(a - b) \times c$
$a - (b + c) \times d$
$a \times (b - c)$
$(a - b) \times c$
$(a + b) \div c$
$a \div (b + c)$
$(a - b) \div c$
$a \div (b - c)$
$a(b - c) + d$
$a(b + c) - d$
$a \times (b - c)^2$
$(a - b)^2$
$(a + b)^2$
$a \times (b - c) \times d$
MIXTURE - Fractions

Decimals

Place Value 11

Complements to 1 - hundredths
Complements to 1 - tenths and hundredths
Complements to 1 - thousandths
Comparing tens and tenths
Ordering decimals (up to 3 d.p.)
Tenths on a number line
Number lines hundredths
Number lines hundredths
Number lines thousandths
Number lines thousandths
MIXTURE - Decimals place value

Addition and subtraction · Addition 9

Counting in tenths
Add decimals across 1
Add decimals - 1 d.p.
Add decimals - hundredths
Add decimals - tenths and hundredths
Add decimals - same number of d.p
Add decimals (up to 2 d.p)
Add decimals (up to 3 d.p)
MIXTURE - addition - decimals

Addition and subtraction · Subtraction 8

Subtract decimals within 1 (hundredths)
Subtract decimals within 1 (tenths and hundredths)
Subtract decimals across 1
Subtract decimals - 1 d.p.
Subtract decimals (same d.p)
Subtract decimals (up to 2 d.p.)
Subtract decimals (up to 3 d.p.)
MIXTURE - subtraction - decimals

Multiplication and division · Multiplication 14

- Multiplying by 10
- Multiplying by 100
- Multiplying by 1,000
- Multiplying by 10,100, 1,000
- Multiplying by 10, 100, 1,000 missing values
- Multiplying a decimal by an integer
- Multiplying by 0.1 and 0.01
- Multiplying by powers of 10
- Multiplying by multiples of 10 or decimals
- Use known facts - multiplication (inc decimals)
- Multiplying decimals
- Multiplying decimals (written methods)
- Multiplying 2 decimals
- MIXTURE - multiplication - decimals

Multiplication and division · Division 16

- Dividing a 1 digit number by 10
- Dividing a 2 digit number by 10
- Dividing a 1 digit number by 100
- Dividing a 2 digit number by 100
- Dividing (up to 3 digit number) by 10
- Dividing (up to 3 digit number) by 100
- Dividing (up to 3 digit number) by 1,000
- Dividing by 10 (including decimals)
- Dividing by 100 (including decimals)
- Dividing by 1,000 (including decimals)
- Dividing by powers dividing by 10, 100, 1,000
- Dividing a decimal by an integer
- Division - Integer by a decimal
- Division - by integers or decimal
- Division - Decimal by a decimal
- MIXTURE - division - decimals

Mixed Arithmetic 7

- Addition and Subtraction
- Mixed arithmetic
- Inverse operations
- Multiplying and dividing by 10, 100, 1,000
- Multiplying and dividing decimal
- Multiplying and dividing decimal
- MIXTURE - mixed arithmetic

Directed numbers

Temperature 7

- Comparing temperatures
- Comparing directed numbers
- Calculating temperature after an increase
- Calculating temperature after a decrease
- Difference between two temperatures
- Ordering temperatures
- MIXTURE - comparing

Arithmetic 13

- Counting in 1's (negative numbers)
- Counting in 2,3,4 5 etc
- Addition crossing zero
- Directed numbers a + -b
- Subtraction crossing zero
- Directed numbers a - -b
- Directed numbers - Addition and subtraction
- Directed numbers - Multiplication and Division
- Directed numbers - Mixed Arithmetic
- Finding more or less
- Directed numbers $\pm a \times \pm b$
- Directed numbers $\pm a \div \pm b$
- MIXTURE - arithmetic

Inverse operations · Directed Numbers - Inverse oprations 8

- Missing numbers: $\boxed{?} - a = b$
- Missing numbers: $\boxed{?} - a = b$
- Missing numbers: $\boxed{?} + a = b$
- Missing numbers: $\boxed{?} - -a = b$
- Missing numbers: $a - \boxed{?} = b$
- Missing numbers: $a \div \boxed{?} = b$
- Missing numbers: $a \times \boxed{?} = b$
- MIXTURE - inverse operations

Equivalence

Decimals and fractions 13

- Decimals as a fraction (1)
- Decimals as a fraction (2)
- Fraction as a decimal (1)
- Fraction as a decimal (2)
- Fraction as decimal (3)
- Decimals and fractions - tenths
- Decimals and fractions - hundredths
- Write division as a fraction
- Use division - fraction as a decimal
- Decimals and fractions mixture
- Decimals and fractions (+ & -)
- Recurring decimals as fractions
- MIXTURE - decimals/fractions

Decimals and percentages 7

- Decimal as a percentage less than 100
- Decimal as a percentage greater than 100
- Percentage as a decimal less than 100
- Percentage as a decimal greater than 100
- Mixture less than 100
- Mixture greater than 100
- MIXTURE - decimals/percentages

Fractions and percentages 4

- Fraction as a percentage
- Percentage as a fraction (1)
- Percentage as a fraction (2)
- MIXTURE - fractions/percentages

Ratios and Fractions 3

- Expressing a ratio as a fraction
- Expressing a fraction as a ratio
- MIXTURE - ratios/fractions

Fractions, Decimals,Percentages 3

- Fractions, decimals and percentages
- Ordering fractions, decimals and percentages
- MIXTURE - equivalence

Estimation

Rounding · Rounding - nearest 10, 100, 1000 11

- Rounding to the nearest 10
- Rounding to the nearest 100
- Rounding to the nearest 1,000
- Mixed Rounding up to 10,000
- Round within 1,000,000
- Round within 1,000,000,000
- Mixed rounding up to 10,000,000
- Rounding to the nearest integer
- Rounding to the nearest tenth
- Rounding to the nearest hundredth
- MIXTURE - rounding 10,100,1000

Rounding · Rounding – Decimal Places 4

Rounding to 1 decimal place
Rounding to 2 decimal places
Rounding to 1 or 2 decimal places
MIXTURE - decimal places

Rounding · Mixed rounding 6

Rounding to 10, 100, 1,000 or 1 d.p.
Rounding to 10, 100, 1,000 or 1/2 d.p.
Rounding to 10, 100, 1,000 or 1 s.f.
Rounding to significant figures or decimal places
Mixture including truncating
MIXTURE - - all

Rounding · Significant Figures 13

Rounding to 1 significant figure (integers)
Rounding to 1 significant figure (decimals)
Rounding to 1 significant figure
Rounding to 2 significant figure (integers)
Rounding to 2 significant figure (decimals)
Rounding to 2 significant figures
Rounding to 1 or 2 significant figures
Rounding to 3 significant figure (integers)
Rounding to 3 significant figure (decimals)
Rounding to 3 significant figures
Rounding-significant figures (integers)
Rounding-significant figures (decimals)
MIXTURE significant figures

Truncating 13

Truncating to thousands
Truncating to hundreds
Truncating to tens
Truncating to an integer
Truncating - mixture
Truncating to 1 d.p.
Truncating to 2 d.p.
Truncating - mixture
Truncating to 1 s.f (integers)
Truncating to 1 s.f (decimals)
Truncating to 2 s.f (integers)
Truncating to 2 s.f (decimals)
MIXTURE - truncating

Error intervals · Error Intervals – measures 7

Error intervals - measures - nearest integer
Error intervals - measures - 1 d.p.
Error intervals - measures - nearest 10
Error intervals - measures - nearest 100
Error intervals - measures - nearest 1,000
Error intervals - mixture
MIXTURE - errors/measures

Error intervals · Error Intervals – numbers 18

Error intervals - numbers - nearest integer
Error intervals - numbers - 1 d.p.
Error intervals - numbers - 2 d.p.
Error intervals - mixture
Truncating to thousands
Truncating to hundreds
Truncating to tens
Truncating to an integer
Error intervals - truncating mixture
Truncating to 1 d.p.
Truncating to 2 d.p.
Error intervals - truncating mixture (d.p.)
Truncating to 1 s.f (integers)
Truncating to 1 s.f (decimals)
Truncating to 2 s.f (integers)

Error intervals · Error Intervals – numbers *continued*

Truncating to 2 s.f (decimals)
Error intervals - truncating mixture (s.f.)
MIXTURE - Error/numbers

Estimating Calculations 7

Estimation : $\frac{a+b}{c}$
Estimation : $\frac{a-b}{c}$
Estimation $\frac{a\times b}{c}$
Estimation $a \times b$
Estimation $a + b$
Estimation $a - b$
MIXTURE - estimation

Upper and Lower bounds · Upper and Lower Bounds 12

Lower Bounds for rounded measures
Upper Bounds for rounded measures
Min/max radius
Min/max perimeter
Min/max containers
Calculations involving bounds -mixture
Min/max $\frac{A\times B}{C}$
Min/max $\frac{A}{B\times C}$
Min/max $A + B - C$
Min/max $C(A - B)$
Min/Max mixture - formula
MIXTURE Min/Max

Properties of numbers

Positive, negative, odd and even numbers 7

Identifying Positive Integers
Identifying Negative Integers
Identifying Integers
Listing even numbers
Listing odd numbers
Finding the reciprocal
MIXTURE

Factors 5

Finding factors
Using factor pairs
Finding common factors
Finding the HCF
MIXTURE - Factors

Multiples 10

Listing multiples of 2
Listing multiples of 5 and 10
Listing multiples of 3
Finding multiples of a number
Listing multiples - mixture
Finding common multiples
Finding the lowest common multiple
Finding LCM using prime factors
Mixture - Finding LCM or HCF
MIXTURE - multiples/LCM/HCF

Primes, squares and cubes · Prime Numbers 4

Listing prime numbers
Product of prime factors (10-100)
Product of prime factors
MIXTURE - prime numbers

Mixture 13

Listing factors and multiple
Listing factors, multiple or prime numbers
Product of primes, LCM and HCF

Mixture *continued*

- Factors, multiple, prime numbers, LCM and HCF
- Number of positive factors
- Using prime factors
- Exponents for a given number of factors
- Smallest number with two remainders
- Factors that are multiples with a restriction
- LCM divided by HCF from prime factors
- Smallest number divisible by three numbers
- Values of k with a given HCF
- MIXTURE - all

Primes, squares and cubes · Square and Cube numbers 8

- Listing square numbers
- Cube numbers
- Finding square and cube numbers
- Cube and square numbers
- Finding square and cube roots
- Finding square, cubes and roots - mixture
- Square roots and intervals
- MIXTURE

Money

Money calculations – non calculator 24

- Pence and pounds
- Adding money (within a pound)
- Adding money
- Subtracting money (within a pound)
- Subtracting money
- Calculating change from £1
- Calculating change from £5
- Calculating change from £10
- Adding money - decimals
- Subtracting money - decimals
- Addition and Subtraction - mixture
- Calculating change from £1 as a decimal
- Calculating change from £5 as a decimal
- Calculating change from £10 as a decimal
- Mixture (12-14)
- Calculating change - multiple spent
- Finding the difference
- Multiplication
- Multiplication
- Division
- Multiplication and division - money
- Multiplication and division - money
- Mixed arithmetic
- MIXTURE - money - non calculator

Money calculations – calculator 6

- Multiplication problems
- Totals and change
- Tickets and change
- Multiply and divide in context
- Problem solving with money
- MIXTURE - money - calculator

Hire Purchase, Interest, VAT and Income tax 10

- Hire Purchase
- Simple interest - calculating the total
- Simple interest - calculating the interest
- Simple interest mixture
- Calculating the price including VAT
- Calculating the price before VAT
- Working with VAT - mixture
- Calculating Income tax
- Net Pay

Hire Purchase, Interest, VAT and Income tax *continued*

- MIXTURE - finance and tax

Fractions

Identifying, equivalence and comparing 17

- Identifying the shaded fraction
- Fractions on a number line
- Equivalent to a unit fraction
- Equivalent to a non-unit fraction
- Equivalent fractions - mixture
- Simplifying fractions
- Simplifying fractions
- Comparing unit fractions
- Comparing non-unit fractions
- Comparing fractions less than 1
- Ordering fractions less than 1
- Comparing fractions greater than 1
- Order unit fractions
- Order non-unit fractions
- Order non-unit fractions
- Compare Mixed numbers
- MIXTURE - idenitfying, comparing, ordering

Sequences and counting 4

- Count beyond 1 (unit fractions)
- Count beyond 1 (increasing)
- Count beyond 1 (decreasing)
- MIXTURE - sequences and camping

Mixed numbers and Improper fractions 7

- Partition a mixed number
- Improper fractions equivalent to whole(s)
- Mixed numbers to improper fractions
- Improper fractions to mixed numbers
- Improper fractions and mixed numbers mixture
- Order Mixed numbers
- MIXTURE - mixed numbers/improper

Fraction of a quantity 10

- Unit fraction of a quantity (up to $\times 12$)
- Unit fraction of a quantity
- Non-unit fraction of a quantity
- Fraction of a quantity - money
- Fraction of a quantity - calculator
- Comparing fractions quantities
- Find the whole - given a unit fraction
- Find the whole - given a fraction
- Find the whole - given a fraction
- MIXTURE - fraction of a quantity

Arithmetic · Addition 12

- Partition the whole
- Partition the whole
- Add fractions within 1
- Add fractions total greater than 1
- Add any two proper fractions
- Inverse operations - fractions
- Add a proper fraction to a mixed number
- Adding mixed numbers - same den
- Adding mixed numbers - common multiple
- Adding mixed numbers
- Inverse operations - mixed numbers
- MIXTURE - fractions - addition

Arithmetic · Subtraction 17

- Subtracting fractions from a whole
- Subtracting fractions - same denominator

Arithmetic · Subtraction *continued*

- Subtract fractions (common multiple den)
- Subtract fractions
- Inverse operations - fractions
- Subtract a whole from a mixed number
- Fraction from a mixed number
- Fraction from a mixed number
- Fraction from a mixed number (across a whole)
- Subtract mixed numbers
- Subtract mixed numbers
- Inverse operations - mixed numbers
- Fractions (common multiple denominators)
- Fractions
- Mixed numbers (common multiple denominators)
- Mixed numbers
- MIXTURE - fractions subtraction

Arithmetic · Decimals and Fractions - addition and subtraction 4

- Fractions and decimals - tenths and hundredth
- Fractions and decimals (answer as a fraction)
- Fractions and decimals (answer as a decimal)
- MIXTURE - fractions and decimals

Arithmetic · Multiplication 9

- Multiply - Unit fraction by an integer
- Find the product of a pair of unit fractions
- Multiply - fraction by an integer
- Find the product of a pair of proper fractions
- Inverse operations - multiplying fractions
- Multiply - mixed number by an integer
- Multiply mixed numbers
- Inverse operations - mixed numbers
- MIXTURE fractions - multiplication

Arithmetic · Division 9

- Dividing a unit fraction by an integer
- Divide an integer by a fraction
- Dividing a fraction by an integer
- Divide a fraction by a unit fraction
- Divide any pair of fractions
- Inverse operations - fractions
- Divide mixed numbers
- Inverse operations - mixed numbers
- MIXTURE - fractions division

Arithmetic · Mixture 11

- Proper fractions - addition and subtraction
- Proper fractions - mixed arithmetic
- Inverse operations - fractions
- Mixed Numbers - addition and subtraction (1)
- Mixed Numbers - addition and subtraction (2)
- Multiply and Divide fractions by an integer
- Proper fractions - multiplication and division
- Mixed numbers - multiplication and division
- Mixed Numbers - Mixed arithmetic
- Inverse operations - mixed numbers
- MIXTURE - fractions - mixed arithmetic

Indices

Evaluating 10

- Positive integer powers (1)
- Positive integer powers (2)
- Negative integer powers
- Negative integer powers and reciprocals
- Fractional powers $\sqrt{a}$ and $a^{\frac{1}{3}}$
- Fractional powers $\frac{1}{2}$ and $\frac{1}{3}$

Evaluating *continued*

- Fractional powers $\frac{n}{m}$
- Negative fractional powers $\frac{1}{2}$ and $\frac{1}{3}$
- Negative fractional powers $\frac{n}{m}$
- MIXTURE - evaluating indicies

Laws of Indices 12

- Multiplying $a^n \times a^m$
- Multiplying $a^n \times a^{-m}$
- Multiplying $a^{-n} \times a^{-m}$
- Multiplying $a^{\frac{m}{n}} \times a^{\frac{p}{q}}$
- Dividing $a^n \div a^m$
- Dividing $a^n \div a^{-m}$
- Dividing $a^{-n} \div a^{-m}$
- Dividing $a^{\frac{m}{n}} \div a^{\frac{p}{q}}$
- Power $(a^n)^m$
- Power $(a^{\pm n})^{\pm m}$
- Multiply and dividing (positive integers)
- MIXTURE - laws of indices

Solving equations involving indices 8

- Solving $\boxed{?}^{\frac{n}{2}} = \frac{1}{m}$
- Solving $\boxed{?}^{\frac{n}{2}} = m$
- Solving $\boxed{?}^{\frac{n}{3}} = \frac{1}{m}$
- Solving $\boxed{?}^{\frac{n}{2}} = m$
- Solving $\boxed{?}^{-\frac{n}{2}} = m$
- Solving $\boxed{?}^{-\frac{n}{3}} = m$
- Solving $a^m \times b^{\boxed{?}} = m$
- MIXTURE - equations with indices

Arithmetic

Addition and Subtraction · Addition 11

- 3 digit + 2 digit
- 3 digit + 3 digit (no exchanges)
- 3 digit + 3 digit (across 10)
- 3 digit + 3 digit (across a 10 and/or 100)
- 3 digit + 3 digit
- 4 digit + 4 digit - no exchange
- 4 digit + 4 digit one exchange
- 4 digit + 4 digit
- 4 digit + 4 digit
- Numbers up to 1,000,000
- MIXTURE - Addition

Addition and Subtraction · Subtraction 11

- 3 digit - 2 digit
- 3 digit - 3 digit (no exchanges)
- 3 digit - 3 digit (across a 10)
- 3 digit - 3 digit (across a 100)
- 3 digit - 3 digit (across a 10 or 100)
- 4 digit - 4 digit no exchange
- 4 digit - 4 digit - (1 exchange)
- 4 digit - 4 digit - (1+ exchange)
- 5 digit - 5 digit
- Numbers up to 1,000,000
- MIXTURE - Subtraction

Addition and Subtraction · Inverse operations 8

- Addition up to 100
- Addition up to 1,000
- Addition up to 10,000
- Subtraction up to 100
- Subtraction up to 1,000
- Subtraction up to 10,000
- Addition and subtraction

Addition and Subtraction · Inverse operations *continued*

MIXTURE - Add/Subtract

Addition and Subtraction · Mixture 6

Finding the sum
Finding the difference
Comparing calculations - addition and subtraction
Addition and Subtraction - 4 digit numbers
Missing numbers in equivalent calculations
MIXTURE

Multiplication and Division · Times Tables 20

Multiplying by 3
Dividing by 3
Multiplying by 4
Dividing by 4
Multiplying by 8
Dividing by 8
Divide a number by 1 and itself
Multiply by 1 and 0
Multiply and divide by 6
Multiply and divide by 9
Multiply and divide by 7
Multiply and divide by 11
Multiply and divide by 12
Multiply mixture
Dividing mixture
Multiplying and Dividing mixture
Comparing single digit calculations
Multiply 3 numbers
Finding the product
MIXTURE- Times tables

Multiplication and Division · Multiplication 18

Using factor pairs
2 digit by a single digit
Comparing calculations - multiples of 10
2 digit by a 1 digit number - no exchange
2 digit by a 1 digit number - with exchange
3 digit by a 1 digit number
4 digit by a 1 digit number
Multiply - by 10
Multiply by 100
Multiply by 10,100 or 1,000
2 digit by 2 digit
3 digit by 2 digit
2 or 3 digit by 1 or 2 digit
4 digit by 2 digit
Multiples of 10, 100, 1,000
Using factors
Comparing related products
MIXTURE - Multiplication

Multiplication and Division · Division 18

Division - related calculations
Dividing by 10
Dividing by 100
Dividing by 10, 100 or 1,000
Division - by multiples of 10, 100, 1,000
2-digit by 1-digit - no exchange
2-digit by 1-digit- with exchange
2-digit by 1-digit- with remainders
3-digit by 1-digit
3-digit by 1-digit- with remainders
3 or 2 digit by 1 digit
3 or 4 digit by 1 digit
Remainders as decimals
Remainders as fractions
4 digit by 1 digit - no remainders

Multiplication and Division · Division *continued*

4 digit by 1 digit - with remainders
3 or 4 digit by 2 digit numbers
MIXTURE - Division

Multiplication and Division 6

Multiples of 10
2 digit numbers
Comparing calculations
Multiple of powers of 10
Related calculations - multiplication and division
MIXTURE - Multiplication/Division

Mixed Arithmetic · Mixed arithmetic 4

Mixed arithmetic
Comparing calculations
Mixed arithmetic (integers)
MIXTURE - Mixed arithmetic

Mixed Arithmetic · Equivalent calculations 6

$a+? = b+c$
$a-? = b-c$
$a-b = ?+c$
$a \times b = c+?$
$? \div a = b \div c$
MIXTURE - Equivalent calculations

Place Value

Words and figures 7

Words to figures up to 1,000
Making large and small numbers (5 digits)
Words to figures to 10,000
Words to figures to 100,000
Words to figures up to 1,000,000
Words to figures up to 1 billion in figures
MIXTURE words/figures

Number lines 6

Number line to 1,000
Number line to 10,000
Estimate numbers
Number lines up to 100,000
Number line up to 1,000,000
MIXTURE - number lines

Place value and partitioning 14

Partition numbers up to 100
Hundreds and tens - equivalence
Place value in numbers up to 1,000
Partition numbers to 1,000
1's, 10's, 100's, 1,000's equivalence
Partition numbers up to 10,000
Flexible partitioning of numbers to 10,000
Place value in numbers up to 1,000,000
Partition numbers up to 1,000,000
Place value within 1
Place value greater than 1
Place value - integers and decimals
Place value - decimals (up to 3 d.p.)
MIXTURE - partitioning

Ordering and comparing · Comparing 6

Compare numbers up to 1,000
Comparing numbers up to 1,000 using < or >
Comparing numbers up to 10,000 using < or >
Comparing numbers up to 100,000
Comparing numbers up to 1,000,000

Ordering and comparing · Comparing *continued*

MIXTURE - comparing

Ordering and comparing · Ordering 7

Order numbers up to 1,000
Order numbers up to 10,000
Order numbers up to 100,000
Order numbers up to 1,000,000
Order numbers up to 10,000,000
Order numbers up to 100,000,000
MIXTURE - ordering

More or less 14

1 more or less than a number
10 more or less than a number
100 more or less than a number
10 or 100 more than a number
10 or 100 less than a number
10, 100 or 1,000 more (1,000)
10, 100 or 1,000 less (1,000)
10, 100 or 1,000 more (10,000)
10, 100 or 1,000 less (10,000)
10, 100 or 1,000 more (1,000,000)
10, 100 or 1,000 less (1,000,000)
Multiples of powers of 10 more than a number
Multiples of powers of 10 less than a number
MIXTURE - more or less

Related Calculations

Using given calculations 30

Finding $10a \times b$
Finding $a \times 10b$
Finding $a \div 10 \times b$
Finding $a \times b \div 10$
Finding $a \div 10 \times b \div 10$
Finding $a \div 10 \times 10b$
Finding $10a \times b \div 10$
Finding $a \div 100 \times b$
Finding $a \times b \div 100$
Finding $a \div 100 \times 10b$
Finding $10a \times b \div 100$
Finding $a \times (b + 1)$
Finding $(a + 1) \times b$
Finding $a \times (b - 1)$
Finding $(a - 1) \times b$
Finding $2a \times b$
Finding $a \times 2b$
Finding $(a - 1) \div 10 \times b$
Finding $a \times (b - 1) \div 10$
Finding $(a + 1) \div 10 \times b$
Finding $a \times (b + 1) \div 10$
Finding $(a - 1) \div 100 \times b$
Finding $a \times (b - 1) \div 100$
Finding $(a + 1) \div 100 \times b$
Finding $a \times (b + 1) \div 100$
Finding $a \div 10 \times (b + 1) \div 10$
Finding $a \div 10 \times (b - 1) \div 10$
Finding $(a + 1) \div 10 \times b \div 10$
Finding $(a - 1) \div 10 \times b \div 10$
MIXTURE -related calculations - mixture

Standard Form

Expressing in standard form 15

Multiplying and dividing by powers of 10
Multiplying positive powers of 10
Dividing positive powers of 10

Expressing in standard form *continued*

Multiplying and Dividing positive powers of 10
Expressing negative powers of 10 as a decimal
Writing in standard form 0 < n < 1
Writing in ordinary form 0 < n < 1
Standard form and ordinary form mixed 0 < n < 1
Writing in standard form - integers
Writing in ordinary form - integers
Writing in ordinary form - mixture
Standard form and ordinary form mixed (n>1)
Writing in standard form - mixture
Writing in standard form
MIXTURE - standard form

Ordering and comparing 7

Ordering > 1
Ordering < 1
Ordering mixture
Comparing > 1
Comparing < 1
Comparing mixture
MIXTURE - ordering/comparing

Arithmetic · Arithmetic - Same power 5

Addition - (decimals) same power
Addition - (integers) same power
Subtraction - (decimals) same power
Subtraction - integers same power
MIXTURE - same power

Arithmetic · Arithmetic - non calculator 12

Multiply numbers in standard form
Addition - (decimals) >1
Addition - (integers) >1
Subtraction - (decimals) >1
Subtraction - (integers) >1
Mixture + and - (decimals) >1
Mixture + and - (integers) >1
Multiply a number in standard form by an integer
Divide a number in standard form by an integer
Multiply numbers in standard form
Multiply and divide numbers in standard form
MIXTURE - non-calculator

Arithmetic · Arithmetic - calculator 7

Standard form - addition - calculator
Standard form - subtraction - calculator
Standard form - multiplication - calculator
Standard form - division - calculator
Standard form - &#215 and &#247 - calculator
Standard form - mixed arithmetic (calculator)
MIXTURE - calculator

Arithmetic · Problems in context 13

How many times heavier
Time from distance and speed
Distance from speed and time
Total after an increase
Power per square metre
Total charge of a sample
How many times greater
Total volume of droplets
Increase by a percentage
Decrease by a percentage
Percentage increase of two readings
Volume after evaporation
MIXTURE - Problem solving in standard form

Surds

Simplifying (10)

- Simplifying : $\sqrt{a}$
- Simplifying : $\sqrt{a} \pm b + \sqrt{a} \pm c$
- Simplifying $n\sqrt{a} \pm b + m\sqrt{a} \pm c$
- Simplifying $n\sqrt{a} + \sqrt{b}$
- Simplifying $n\sqrt{a} \times m\sqrt{a}$
- Simplifying $\sqrt{a} \times \sqrt{b}$
- Simplifying $m\sqrt{a} \times n\sqrt{b}$
- Simplifying expressions involving surds
- Simplifying and multiplying mixture
- MIXTURE - simplifying/surds

Expanding brackets (7)

- Expanding brackets : $\sqrt{a}(a\sqrt{b} \pm c)$
- Expanding brackets : $\sqrt{a}(b \pm \sqrt{a})$
- Single bracket mixture
- Expanding brackets $a\sqrt{b}(c\sqrt{d} \pm e)$
- Expanding brackets $(\sqrt{a} \pm b)(\sqrt{a} \pm c)$
- Expanding brackets $(a\sqrt{b} \pm c)(d\sqrt{b} \pm e)$
- MIXTURE - Expanding brackets

Rationalising the denominator (4)

- $\frac{a}{\sqrt{b}}$
- $\frac{a}{c \pm \sqrt{b}}$
- $\frac{a \pm \sqrt{b}}{c \pm \sqrt{b}}$
- MIXTURE - rationalising

Using a calculator

Language and inverses (4)

- Products, sums and differences
- Inverse operations (1)
- Inverse operations (2)
- MIXTURE - language

Powers and roots (8)

- Squares and roots
- Squares and square roots mixture
- Evaluating roots
- Evaluating indices
- Evaluating powers and roots
- Calculations with indices and directed numbers
- Calculations with indices
- MIXTURE - all

Equivalence (6)

- Expressing a fraction as a decimal
- Finding the reciprocal
- Comparing fractions and decimals
- Simplify a ratio
- Arithemetic with decimals
- MIXTURE - equivalence

Pythagoras calculations (3)

- Pythagoras calculations (1)
- Pythagoras calculations (2)
- MIXTURE - pythagoras

Complex calculations - positive numbers (22)

- Order of operations
- Using a calculator : $a \times \sqrt{b}$
- Using a calculator : $a \times \sqrt{b} + \sqrt{c}$
- Using a calculator $a \times b^2 + \sqrt{b}$
- Using a calculator $a \times b^2 + \sqrt{c \times d}$
- Using a calculator $\sqrt{a} \times b + c \times \sqrt{d}$

Complex calculations - positive numbers *continued*

- Using a calculator $\sqrt{a \times b^2} + c \times \sqrt{d}$
- Using a calculator $a \times \sqrt{b} - \sqrt{c}$
- Using a calculator $a \times b^2 - \sqrt{c}$
- Using a calculator $a \times b^2 - \sqrt{c \times d}$
- Using a calculator $\sqrt{a \times b} - c \times \sqrt{d}$
- Using a calculator $\sqrt{a \times b^2} - c \times \sqrt{d}$
- Using a calculator $a - \frac{b}{c}$
- Using a calculator $\sqrt{a - b} + c$
- Using a calculator $\sqrt{a^2 - b} - \sqrt{c}$
- Using a calculator $\sqrt[3]{a + \frac{c}{b}}$
- Using a calculator $\sqrt[3]{\frac{a}{b}} + c^3$
- Using a calculator $a^2 + b^3 + c^4$
- Using a calculator $\frac{b}{a} \times 10^3$
- Using a calculator $\frac{a}{b+c}$
- Powers and root mixture
- MIXTURE - all

Complex calculations - negative numbers (7)

- Directed numbers : $-a \times -b - c$
- Directed numbers : $-a + -b + c$
- Directed numbers $-(a)^2 + -b + c$
- Directed numbers $(-a)^2 + -b + c$
- Directed numbers $(-a)^2 - -b + -c$
- Directed numbers $(-a)^2 - -b - -c$
- MIXTURE - Directed numbers

Products and combinations

Products and combinations (8)

- Dials
- Dials - multiples of 5 or 10
- Dials - Odd and even
- Menu - 3 course selection
- Menu - 2 course selection
- Cards - Different numbers
- Cards - Different pairs
- MIXTURE - produce/combinations

Proportion

Mixed Problems (16)

- Solve problems involving scaling
- Solve problems involving rates
- Direct Proportion problems (£s)
- Direct Proportion problems
- Direct Proportion - mixture
- Solving recipe problems
- Calculating wages
- Wages and overtime
- Wages mixture
- Solving best buy problems
- UK currency for foreign currency
- Foreign currency to UK currency
- Exchange rates - non calculator
- Exchange rates - comparing prices
- Inverse proportion problems
- MIXTURE - Direct and inverse proportion

Proportion formulae · Direct proportion (6)

- Direct proportion : $y \propto kx$
- Direct proportion : $y \propto kx^2$
- Direct proportion $y \propto k\sqrt[3]{x}$
- Direct proportion $y \propto kx^3$
- Direct proportion $y \propto k\sqrt{x}$
- MIXTURE - Direct proportion - formula

Proportion formulae · Inverse proportion 5

Inverse proportion : $y \propto \frac{k}{x}$
Inverse proportion : $y \propto \frac{k}{x^2}$
Inverse proportion $y \propto \frac{k}{\sqrt{x}}$
MIXTURE - Inverse proportion
MIXTURE - Proportion

Proportion formulae · 3 variables 9

Direct and inverse proportion
Square root and direct proportion
Square root and inverse square proportion
Square and inverse square proportion
Inverse and square proportion
Inverse root and square proportion
Inverse and square root proportion
Inverse square and square root proportion
MIXTURE - all

Percentages

Calculator · Mixed percentages 18

Calculating a percentage of a quantity
Calculating a percentage of a quantity > 100%
Identifying multipliers for percentage increases
Identifying multipliers for percentage decreases
Identifying multipliers mixture
Increasing by a given percentage
Decreasing by a given percentage
Increasing and decreasing by a given percentage
Calculate the percentage increase
Calculate the percentage decrease
Calculate the percentage change
Calculate a percentage change
Expressing as a percentage
Finding the original < 100%
Finding the original > 100%
Finding the original mixture
Mixed problems
MIXTURE - percentages / calculator

Calculator · Repeated percentage change 14

Stating a formula for % increase
Stating a formula for % decrease
Identifying the interest rate
Identifying the rate of depreciation
Calculating compound interest
Compound interest - years
Compound interest - total
Population decrease - total
Population decrease - overall percentage decrease
Population Decrease - years
Calculate depreciation -car
Interest and Depreciation Mixture
Growth and decay formulae
MIXTURE - repeated percentage change

Calculator · Mixed contexts 10

Percentage profit on mugs
Percentage more paid for a car
Matching holiday discounts
Sharing money using percentages
Repeated percentage change of a house
Percentage increase in savings
Comparing two bank accounts
Percentage profit on books
Profit on loaves of bread
MIXTURE - mixed percentage contexts

Non-calculator · Percentage of a quantity 16

Understanding percentages (35% = 3 × 10% + 5%)
50% of a quantity
25% and 50% of a quantity
10% of a quantity
10% and 20% of a quantity
20% of a quantity
10% and 5% of a quantity
5% of a quantity
5% 10% and 15% of quantity
5% 10% and 20% of a quantity
15% of a quantity
Multiples of 5%
Calculating a percentage of a quantity - money
Percentages - missing values
Fraction or percentage of a quantity
MIXTURE - percentage of a quantity

Non-calculator · Increasing and decreasing 9

Increasing 10%
Increasing 5%
Increasing 20%
Increasing multiples (5%)
Decreasing 10%
Decreasing 5%
Decreasing 20%
Decreasing multiples (5%)
MIXTURE - Increase/Decreasing

Non-calculator · Mixture 10

Expressing as a percentage
Expressing as a percentage
Expressing as a percentage - mixture
Calculate a percentage increase
Calculate a percentage decrease
Non calculator mixture
Calculate a percentage change
Finding the original
Finding the original - money
MIXTURE - percentage change

Ratio

Simplifying and equivalence 10

Using ratio language
Using the ratio symbol
Simple ratio problems
Solve problems involving ratios of the form m : n
Completing equivalent ratios
Simplifying ratios
Simplifying ratios (mixed units)
Expressing in the form 1:n
Expressing in the form 1:n or n:1
MIXTURE - simplifying ratios

Dividing in a ratio 9

Dividing in a given ratio
Dividing in a given ratio - difference known
Dividing in a given ratio - one share known
Find the larger share - smaller known
Find the smaller share -larger known
Find the larger share - difference known
Find the smaller share - difference known
Mixed questions - difference or 1 part known
MIXTURE - dividing in a given ratio

Maps and Scale 7

Using scale drawings
Interpret scale diagrams - model to real

Maps and Scale *continued*

Interpret scale diagrams - real to model to real
Interpret maps - map to real
Interpret maps - real to map
Maps - mixed questions
MIXTURE - maps and scales

Combined Ratios 6

a:b and b:c - find a:c
a:b and b:c - express as a fraction
a:b and b:c -calculate a quantity
na =mb and b:c - find a:b:c
na =mc and b:c - find a:c
MIXTURE - combined ratios

02 SECONDARY Algebra

105 topics
1000 structures

Algebraic Fractions

Addition and subtraction 12

Simplify : $\frac{x}{a}+\frac{x}{b}$
Simplify : $\frac{x}{a}-\frac{x}{b}$
Simplify $\frac{ax}{b}+\frac{cx}{d}$
Simplify $\frac{ax}{b}-\frac{cx}{d}$
Simplify $\frac{x+a}{b}+\frac{x+c}{d}$
Simplify $\frac{x+a}{b}-\frac{x+c}{d}$
Simplify $\frac{x+a}{b}-\frac{x-c}{d}$
Simplify $\frac{x-a}{b}-\frac{x+c}{d}$
Simplify $\frac{x-a}{b}-\frac{x-c}{d}$
Simplify $\frac{x-a}{b}+\frac{x-c}{d}$
Simplify $\frac{x+a}{b}-\frac{x-c}{d}$
MIXTURE - Simplifying

Multiplication and Division 3

Multiply algebraic fractions
Divide algebraic fractions
MIXTURE - multiply/divide

Difficult simplifying 10

Difference divided by a fraction
Product then subtract a bracket
Product then add a bracket
Fraction multiplied by a difference
Product then subtract a fraction
Number minus a quotient
Show the result is $\frac{a}{x+b}$
Substitute $k=x-y$
Express a in terms of y
MIXTURE - algebraic fractions

Solving Equations 9

Equations - fractions: $\frac{a}{x}+\frac{b}{x+c}=d$
Equations - fractions : $\frac{a}{x}-\frac{b}{x+c}=d$
Equations - fractions : $\frac{a}{x}+\frac{b}{x-c}=d$
Equations - fractions : $\frac{a}{x-c}-\frac{b}{x}=d$
Equations - fractions: $\frac{a}{x+b}+\frac{c}{x+d}=e$
Equations - fractions : $\frac{a}{x+b}-\frac{c}{x+d}=e$
Equations - fractions : $\frac{a}{x-b}-\frac{c}{x+d}=e$
Equations - fractions : $\frac{a}{x-b}-\frac{c}{x-d}=e$
MIXTURE - solving

Changing the subject

One step 7

Change the subject - 1 step : $y=x+a$
Change the subject - 1 step $y=x-a$
Change the subject - 1 step $y=ax$
Change the subject - 1 step $y=\frac{a}{x}$
Change the subject - 1 step $y=\frac{x}{a}$

One step *continued*

Change the subject - 1 step $y=a-x$
MIXTURE - 1 step

Two step 8

$y=ax+b$
$y=ax-b$
$y=b-ax$
$y=\frac{x}{a}+b$
$y=\frac{x}{a}-b$
$y=\frac{x+a}{b}$
$y=\frac{x-a}{b}$
MIXTURE - 2 step

Complex formulae 12

$y=\sqrt{x+a}$
$y=\sqrt{x-a}$
$y=\sqrt{a-x}$
$y=\frac{\sqrt{x}}{a}$
$y=\frac{a}{\sqrt{x}}$
$y=\sqrt{\frac{a}{x}}$
$y=\sqrt{\frac{x}{a}}$
$y=\sqrt{x}+a$
$y=\sqrt{x}-a$
$y=-\sqrt{x}$
Rearrange complex formula :mixture (1)
MIXTURE -

Subject appears twice 16

$ax=bx+c$
$ax=c-bx$
$ax+b=cx+d$
$ax-b=cx+d$
$ax-b=d-cx$
$ax+b=d-cx$
$\frac{x+a}{x+b}=c$
$\frac{x-a}{x+b}=c$
$\frac{x+a}{x-b}=c$
$\frac{x-a}{x-b}=c$
$\frac{x}{x-b}=c$
$\frac{x}{x+b}=c$
$\frac{ax+b}{cx+d}=e$
$\frac{ax-b}{cx+d}=e$
$\frac{ax-b}{cx-d}=e$
MIXTURE - Subject appears twice

Linear Equations

Linear Equations (1) · Forming equations 5

Forming single step expressions
Forming equations 1 step
Forming equations 2 step

Linear Equations (1) · Forming equations *continued*

Forming and solving equations
MIXTURE - forming and solving

Linear Equations (1) · Solving one-step equations 6

One step equations $x + a = b$
One step equations $x - a = b$
One step equations $a - x = b$
One step equations $ax = b$
One step equations $\frac{x}{a} = b$
MIXTURE - One step

Linear Equations (1) · Solving two-step equations 9

Positive solutions $ax + b = c$
Positive solutions $ax - b = c$
Positive solutions $a - bx = c$
Negative solutions $ax + b = c$
Negative solutions $ax - b = c$
Negative solutions $a - bx = c$
Positive mixture
Negative Mixture
MIXTURE postive/negative

Linear Equations (1) · Solving equations with fractions 7

Equations with fractions $\frac{x}{a} - b = c$
Equations with fractions $\frac{x}{a} + b = c$
Equations with fractions $\frac{x+a}{b} = c$
Equations with fractions $\frac{x-a}{b} = c$
Equations with fractions $a - \frac{x}{b} = c$
Equations with fractions $\frac{x-a}{b} = x \pm c$
MIXTURE - Equations with fractions

Linear Equations (1) · Solving equations with brackets 12

Solving $a(bx + c) = d$
Solving $a(bx - c) = d$
Solving $a(c - bx) = d$
Solving Mixture (1)
Solving Mixture (2)
Solving $a(bx + c) + d = e$
Solving $a(bx - c) + d = e$
Solving $a(bx + c) - d = e$
Solving $a(bx - c) - d = e$
Solving $a(b - cx) + d = e$
Solving $a(b - cx) - d = e$
MIXTURE - Equations with bracket

Linear Equations (1) · Unknown on both sides 15

Both sides $ax + b = x + c$
Both sides $ax - b = x + c$
Both sides $ax + b = x - c$
Both sides $ax - b = x - c$
Both sides $ax + b = c - x$
Both sides $ax - b = c - x$
Both sides $ax + b = cx + d$
Both sides $ax - b = cx + d$
Both sides $ax + b = cx - d$
Both sides $ax - b = cx - d$
Both sides $ax + b = d - cx$
Both sides $ax - b = d - cx$
Both sides mixture
Mixture including fractions and brackets
MIXTURE - all

Linear Equations (1) · Unknown on both sides & brackets 15

Both sides $a(bx + c) = dx + e$

Linear Equations (1) · Unknown on both sides & brackets *continued*

Both sides $a(bx - c) = dx + e$
Both sides $a(bx + c) = dx - e$
Both sides $a(bx - c) = dx - e$
Both sides $a(c - bx) = dx + e$
Both sides $a(c - bx) = dx - e$
Both sides $ax + b = \frac{cx+d}{e}$
Both sides $ax - b = \frac{cx+d}{e}$
Both sides $ax + b = \frac{cx-d}{e}$
Both sides $ax - b = \frac{cx-d}{e}$
Both sides $a - bx = \frac{cx+d}{e}$
Both sides $a - bx = \frac{cx-d}{e}$
Both sides $a \pm b(x \pm c) = ex \pm f$
Both sides $a \pm b(x \pm c) = e$
MIXTURE - Both sides/brackets

Linear Equations (1) · Solving complex equations 21

Equations with fractions $\frac{x}{a} + b = cx + d$
Equations with fractions $\frac{x}{a} - b = cx + d$
Equations with fractions $\frac{x}{a} + b = cx - d$
Equations with fractions $\frac{x}{a} - b = cx - d$
Equations with fractions $b - \frac{x}{a} = cx + d$
Equations with fractions $b - \frac{x}{a} = cx + d$
Equations with fractions $\frac{x}{a} + b = \frac{x}{c} + d$
Equations with fractions $\frac{x}{a} - b = \frac{x}{c} + d$
Equations with fractions $\frac{x}{a} + b = \frac{x}{c} - d$
Equations with fractions $\frac{x}{a} - b = \frac{x}{c} - d$
Equations with fractions $\frac{x}{a} + b = d - \frac{x}{c}$
Equations with fractions $\frac{x}{a} - b = d - \frac{x}{c}$
Equations with fractions $\frac{x}{a} + \frac{x}{b} = c$
Equations with fractions $\frac{x}{a} - \frac{x}{b} = c$
Equations with fractions $\frac{x}{a} + \frac{x}{b} = cx + d$
Equations with fractions $\frac{x}{a} - \frac{x}{b} = cx + d$
Equations with fractions $\frac{x}{a} + \frac{x}{b} = cx - d$
Equations with fractions $\frac{x}{a} - \frac{x}{b} = cx - d$
Equations with fractions $\frac{x}{a} + \frac{x}{b} = e - dx$
Equations with fractions $\frac{x}{a} - \frac{x}{b} = e - dx$
MIXTURE - fractions

Linear Equations (1) · Equations and Inequalities 1

Equations and inequalities mixture

Linear Equations (2) · Solving one step equations 5

One step equations $b = x + a, b = a + x$
One step equations $b = x - a$
One step equations $b = a - x$
One step equations $b = \frac{x}{a}$
MIXTURE - one step

Linear Equations (2) · Solving two step equations 4

Two step equations $b = ax + b$
Two step equations $b = ax - b$
Two step equations $b = a - bx$
MIXTURE - two step

Linear Equations (2) · Solving equations with fractions 6

Fractions $c = \frac{x}{a} + b$
Fractions $c = \frac{x}{a} - b$
Fractions $c = a - \frac{x}{b}$
Fractions $c = \frac{x+a}{b}$
Fractions $c = \frac{x-a}{b}$
MIXTURE - fractions(1)

Linear Equations (2) · Solving equations with brackets 4

Brackets $d = a(bx + c)$

Linear Equations (2) · Solving equations with brackets *continued*

Brackets $d = a(bx - c)$
Brackets $d = a(c - bx)$
MIXTURE - brackets

Linear Equations (2) · Solving equations with fractions - non integer solutions 6

Fractions $d = \frac{ax}{b} + c$
Fractions $d = \frac{ax}{b} - c$
Fractions $d = c - \frac{ax}{b}$
Fractions $d = \frac{ax+b}{c}$
Fractions $d = \frac{ax-b}{c}$
MIXTURE - fraction(2)

Linear Equations (2) · Solving equations with brackets - non integer solutions 4

Brackets $d = a(bx + c)$
Brackets $d = a(bx - c)$
Brackets $d = a(c - bx)$
MIXTURE - brackets

Quadratic Equations

Factorising · Single bracket 4

Factorise and solve : $x^2 - ax = 0$
Factorise and solve :$ax^2 + bx = 0$
Factorise and solve $ax^2 - bx = 0$
MIXTURE - single bracket - factorise and solve

Factorising · Double brackets 16

Factorise and solve $x^2 + bx + c = 0$
Factorise and solve $x^2 \pm bx - c = 0$
Factorise and solve $x^2 \pm bx + c = 0$
Factorise and solve $x^2 \pm 2ax + a^2 = 0$
Factorise and solve mixture (8 - 11)
Factorise and solve $x^2 - b^2 = 0$
Factorise and solve $a^2x^2 - b^2 = 0$
Factorise and solve $ax^2 + bx + c = 0$
Factorise and solve $ax^2 \pm bx - c = 0$
Factorise and solve $ax^2 - bx + c = 0$
Factorise and solve $ax^2 \pm 2abx + b^2 = 0$
Factorise and solve mixture (13-18)
Factorise and solve mixture (8 - 19)
Rearrange and solve
Rearrange and solve
MIXTURE - double brackets - factorise and solve

Completing the square 6

Expressing in the form : $(x \pm a)^2 \pm b$
Expressing in the form : $a(x \pm b)^2 \pm c$
Completed square form mixture
Solve $x^2 \pm bx \pm c = 0$
Solve $ax^2 \pm bx \pm c = 0$
MIXTURE - completed square form

Using the formula · Using the quadratic formula 5

Find the discriminant
Solve $x^2 \pm bx \pm c = 0$
Solve $ax^2 \pm bx \pm c = 0$
Rearrange and solve
MIXTURE - using the formula

Using the formula · Fractions - Quadratic formula 9

Equation - fractions $\frac{a}{x} + \frac{b}{x+c} = d$
Equation - fractions $\frac{a}{x} - \frac{b}{x+c} = d$
Equation - fractions $\frac{a}{x} + \frac{b}{x-c} = d$

Using the formula · Fractions - Quadratic formula *continued*

Equation - fractions $\frac{a}{x-c} - \frac{b}{x} = d$
Equation - fractions $\frac{a}{x+b} + \frac{b}{x+d} = e$
Equation - fractions $\frac{a}{x+b} - \frac{b}{x+d} = e$
Equation - fractions $\frac{a}{x-b} - \frac{c}{x+d} = e$
Equation - fractions $\frac{a}{x-b} - \frac{c}{x-d} = e$
MIXTURE - fractions/quadratic

Using iterative formulae 8

Iteration $x_{n+1} = \frac{x_n^2 - c}{b}$
Iteration $x_{n+1} = \sqrt{bx_n + c}$
Iteration $x_{n+1} = b + \frac{c}{x_n}$
Iteration $x_{n+1} = \frac{c}{x_n - b}$
Iteration $x_{n+1} = b - \frac{c}{x_n}$
Iteration $x_{n+1} = \frac{c}{b - x_n}$
Find the first three iterates
MIXTURE - iterations

Forming and solving 10

Rectangle area
Ball height
Profit
Numbers differing by 1
Square and rectangle
Journey time
Circle areas
Quadratic sequence
Triangle area
MIXTURE - Form and solve

Simultaneous Equations

Linear Equations · Pairs and problems 3

Finding pairs of values
Solve problems with two unknowns
MIXTURE - pairs and problems

Linear Equations · Solving by elimination - no multiplying 7

$ax + by = r$ and $ax - y = s$
$ax + by = r$ and $ax + y = s$
$ax - by = r$ and $ax - y = s$
$ax + by = r$ and $x - by = s$
$ax - by = r$ and $x - by = s$
$ax + by = r$ and $x + by = s$
MIXTURE - Simultaneous Equations(1)

Linear Equations · Solving by elimination 8

$x - by = r$ and $cx + dy = s$
$x + by = r$ and $cx - dy = s$
$x - by = r$ and $cx - dy = s$
$ax + y = r$ and $cx + dy = s$
$ax - y = r$ and $cx + dy = s$
$ax + y = r$ and $cx - dy = s$
$ax - y = r$ and $cx - dy = s$
MIXTURE - Simultaneous Equations(2)

Non linear Equations 9

$x + y = s$ and $xy = p$
$ax + y = c$ and $x^2 + by = d$
$y = mx$ and $y = x^2 \pm c$
$y = x \pm a$ and $y = x^2 \pm b$
$x^2 + y^2 = r^2$ and $y = x \pm c$
$x^2 + y^2 = r^2$ and $y = ax \pm c$
$x^2 \pm axy^2 \pm by = c$ and $x + y = d$
$ax^2 \pm by^2 = c$ and $x + y = d$
MIXTURE - Simultaneous equations - Non linear

Forming and solving simultaneous equations 5

Form and solve - tickets
Form and solve - pens and pencils
Form and solve - two numbers
Form and solve - rectangle
MIXTURE - Form and solve - Simultaneous Equations

Expanding brackets

Single bracket 9

Expanding : $a(bx+c)$
Expanding : $a(bx-c)$
Expanding $a(b-cx)$
Expanding mixture
Expanding $ax(bx+c)$
Expanding $ax(bx-c)$
Expanding $ax(b-cx)$
Single brackets - expanding and factorising
MIXTURE - Expanding

Single bracket · Single bracket and simplify 17

Expanding $a(bx+c)+d$
Expanding $a(bx+c)-d$
Expanding $a(bx+c)+dx$
Expanding $a(bx+c)-dx$
Expanding $a(bx-c)+d$
Expanding $a(bx-c)-d$
Expanding $a(bx-c)+dx$
Expanding $a(bx-c)-dx$
Expanding $a+b(cx+d)$
Expanding $a+b(cx-d)$
Expanding $ax+b(cx+d)$
Expanding $ax+b(cx-d)$
Expanding $a-b(cx+d)$
Expanding $a-b(cx-d)$
Expanding $ax-b(cx+d)$
Expanding $ax-b(cx-d)$
MIXTURE

Single Bracket · Multiple single brackets 11

Expanding : $a(bx+c)+d(ex+f)$
Expanding : $a(bx-c)+d(ex+f)$
Expanding $a(bx+c)+d(ex-f)$
Expanding $a(bx-c)+d(ex-f)$
Expanding Mixture (1)
Expanding $a(bx+c)-d(ex+f)$
Expanding $a(bx-c)-d(ex+f)$
Expanding $a(bx+c)-d(ex-f)$
Expanding $a(bx-c)-d(ex-f)$
Expanding Mixture (2)
MIXTURE - all

Double Brackets · Double Brackets (1) 11

Expanding : $(x+a)(x+b)$
Expanding : $(x-a)(x-b)$
Expanding $(x+a)(x-b)$
Expanding $(x-a)(x+b)$
Expanding $(x+a)^2$
Expanding $(x-a)^2$
Expanding $(x\pm a)^2$
Expanding $(x-a)(x+a)$
Expanding Mixture - double brackets(1)
Expanding $(x^2\pm a)(x\pm b)$
MIXTURE - expandin double brackets (2)

Double Brackets · Double Brackets (2) 8

Expanding $(ax+b)(cx+d)$
Expanding $(ax-b)(cx+d)$

Double Brackets · Double Brackets (2) *continued*

Expanding $(ax+b)(cx-d)$
Expanding $(ax-b)(cx-d)$
Expanding $(ax+b)^2$
Expanding $(ax-b)^2$
Expanding Mixture (1)
MIXTURE Expanding double brackets

Three Brackets 1

Expanding 3 brackets

Factorising

Single Bracket 16

Factorising : $axy+bx$ or $axy+by$
Factorising : $axy-bx$ or $axy-by$
Factorising : ax^2+bx or ay^2+by
Factorising : ax^2-bx or ay^2-by
Factorising : $bx-ax^2$ or $by-ay^2$
Factorising : $ax+b$
Factorising : $ax-b$
Factorising $a-bx$
Factorising Mixture (1)
Single brackets - expanding and factorising
Factorising ax^2+bx
Factorising ax^2-bx
Factorising $bx-ax^2$
Factorising Mixture (2)
MIXTURE - single bracket
MIXTURE

Double brackets 15

Factorising : x^2+bx+c
Factorising : $x^2\pm bx-c$
Factorising x^2-bx+c
Factorising $x^2\pm 2ax+a^2$
Factorising Mixture - double brackets
Factorising : x^2-b^2
Factorising : $a^2x^2-b^2$
Factorising Difference of 2 squares
Factorising ax^2+bx+c
Factorising $ax^2\pm bx-c$
Factorising ax^2-bx+c
Factorising to $(ax+b)^2$
Factorising to $(ax-b)^2$
Factorising Mixture (1)
Factorising Mixture (2)

Functions

Evaluting functions 17

Evaluating functions : ax^2-b
Evaluating functions : $b-ax^2$
Evaluating functions $(ax)^2+b$
Evaluating functions $\frac{ax^2}{b}$
Evaluating functions $\frac{ax^2}{b}+c$
Evaluating functions $\frac{ax^2}{b}-c$
Evaluating functions $\sqrt{ax+b}$
Evaluating functions $\sqrt{b-ax}$
Evaluating functions $\sqrt{\frac{x+a}{b}}$
Evaluating functions x^2+x
Evaluating functions $ax^2\pm x$
Evaluating functions $x^2\pm ax$
Evaluating functions $ax^2\pm bx$
Evaluating functions $ax-bx^2\pm c$
Evaluating functions $ax^3\pm bx^2$
Evaluating functions $ax^3\pm bx^2\pm cx\pm d$

Evaluating functions *continued*

MIXTURE - evaluating

Inverse functions 44

Inverse functions $x - a$
Inverse functions :$x + a$
Inverse functions $a - x$
Inverse functions ax
Inverse functions $\frac{x}{a}$
Inverse functions $\frac{a}{x}$
Inverse functions $ax + b$
Inverse functions $b - ax$
Inverse functions $ax - b$
Inverse functions $\frac{x+b}{a}$
Inverse functions $\frac{x-b}{a}$
Inverse functions $\frac{b-x}{a}$
Inverse functions $\frac{a}{x+b}$
Inverse functions $\frac{a}{x-b}$
Inverse functions $\frac{x}{a} + b$
Inverse functions $\frac{x}{a} - b$
Inverse functions $\sqrt{x}$
Inverse functions $a\sqrt{x}$
Inverse functions $\sqrt{x + a}$
Inverse functions $\sqrt{x - a}$
Inverse functions $\sqrt{a - x}$
Inverse functions $\frac{\sqrt{x}}{a}$
Inverse functions $\frac{a}{\sqrt{x}}$
Inverse functions $\sqrt{\frac{a}{x}}$
Inverse functions $\sqrt{\frac{x}{a}}$
Inverse functions $\sqrt{x} + a$
Inverse functions $\sqrt{x} - a$
Inverse functions $a - \sqrt{x}$
Inverse functions $a\sqrt{x + b}$
Inverse functions $a\sqrt{x - b}$
Inverse functions $a + \sqrt{x - b}$
Inverse functions $a - \sqrt{x - b}$
Inverse functions $a - \sqrt{x + b}$
Inverse functions $\frac{\sqrt{x+b}}{a}$
Inverse functions $\sqrt{\frac{x-b}{a}}$
Inverse functions $\sqrt{\frac{x+b}{a}}$
Inverse functions $\frac{\sqrt{x}}{a} + b$
Inverse functions $\frac{\sqrt{x}}{a} - b$
Inverse functions $b - \frac{\sqrt{x}}{a}$
Inverse functions $\sqrt{ax + b}$
Inverse functions $\sqrt{ax - b}$
Inverse functions $\sqrt{b - ax}$
Inverse functions $\frac{\sqrt{x}}{a} + b$
MIXTURE - Inverse functions

Composite functions 12

$fg(x)\ f(x) = ax \pm b\ g(x) = cx \pm d$
$gf(x)\ f(x) = ax \pm b\ g(x) = cx \pm d$
$fg(x)\ f(x) = x^2\ g(x) = ax \pm b$
$g(x)\ f(x) = x^2\ g(x) = ax \pm b$
$fg(x)\ f(x) = ax^2\ g(x) = bx \pm c$
$gf(x)\ f(x) = ax^2\ g(x) = bx \pm c$
$fg(x)\ f(x) = x^2 \pm a\ g(x) = x \pm b$
$gf(x)\ f(x) = x^2 \pm a\ g(x) = x \pm b$
$fg(x)\ f(x) = a \pm bx\ g(x) = cx \pm d$
$gf(x)\ f(x) = a \pm bx\ g(x) = cx \pm d$
Mixture - inverse
Mixture - Inverse and composite

Function Machines

Single function Machines - find the output 10

Find the output : $+a$
Find the output : $-a$
Find the output $\times a$
Find the output $\div a$
One-step output mixture (1 - 4)
Find the output - decimals $+a$
Find the output - decimals $-a$
Find the output - decimals $\times a$
Find the output - decimals $\div a$
MIXTURE - output

Single function Machines - find the input 6

One-step output mixture (4 - 8)
Find the input : $+a$
Find the input : $-a$
Find the input $\times a$
Find the input $\div a$
MIXTURE - 1 step input

Double functions - find the output 9

Find the output $\times a + b$
Find the output $\times a - b$
Find the output $+a \times b$
Find the output $\div a + b$
Find the output $\div a - b$
Find the output $+a \div b$
Find the output $-a \div b$
Find the output $-a \times b$
MIXTURE - 2 step output

Double functions - find the input 10

Find the input $\times a + b$
Find the input $\times a - b$
Find the input $+a \times b$
Find the input $\div a + b$
Find the input $\div a - b$
Find the input $+a \div b$
Find the input $-a \div b$
Find the input $-a \times b$
MIXTURE - 2 step input
MIXTURE - input/output

Forming expressions 3

Find an expression for the output
Find the function
MIXTURE - expressions/functions

Finding missing functions 1

Two-step - missing functions

Formula

Writing formulae · Writing formula 12

Taxi fare
Boxes of biscuits
Plant growth
Gym membership
Nth term of a sequence
Tiles in a pattern
Multiply then decrease
Distance at constant speed
Percentage discount
Babysitting pay
Juice remaining
MIXTURE - writing formulae

Writing formulae · Using formula 9

- Taxi fare (use formula)
- Taxi fare (find miles)
- Boxes of biscuits
- Boxes of biscuits (find boxes)
- Plant growth (use formula)
- Plant growth (find weeks)
- Gym membership (use formula)
- Gym membership (find sessions)
- MIXTURE - using formulae

Graphs

Linear graphs · Vertical, horizontal and $y = \pm x$ 8

- Lines parallel to the x-axis
- Lines parallel to the x-axis (Diagram)
- Lines parallel to the y-axis
- Lines parallel to the y-axis (Diagram)
- Lines parallel to the axes
- Lines parallel to the axes (diagram)
- 2 coordinates given
- MIXTURE parallel to the axes

Linear graphs · Coordinates on lines 9

- Does a point lie on $y = mx$
- Does a point lie on $y = mx \pm c$
- Complete a coordinate for $y = x \pm c$
- Complete a coordinate for $y = mx$
- Complete a coordinate for $y = mx \pm c$
- Complete a coordinate mixture
- Find the mid-point of a line segment
- Identify equations of non-linear graphs
- MIXTURE - point and midpoints

Linear graphs · Finding the gradient 7

- Determine which is the steeper line
- Identify the gradient (diagram)
- Identify the gradient of $y = mx \pm c$
- Identify the gradient after rearranging
- Gradient of the line passing through (0,a) and (b,c)
- Gradient of the line passing through (a,b) and (c,d)
- MIXTURE - gradients

Linear graphs · Finding the intercept 7

- Identify the $y, axis$ intercept for $y = x \pm a$
- Identify the $x, axis$ intercept for $y = x \pm a$
- Identify the $y, axis$ intercept for $y = mx \pm c$
- Identify the intercept after rearranging
- Identify the gradient or intercept
- Identify the gradient or intercept after rearranging
- MIXTURE - intercepts

Linear graphs · Equation of a straight line 11

- Identifying an equation of a straight line
- Equation of a line - 2 function machines
- Equation of a line - through (a,b) and (0,c)
- Equation of a line - through (a,b) and (c,d)
- Equation of a line - gradient and y-intercept
- Equation of a line - gradient and (a,b) given
- Equation of a line $y = mx \pm c$ - positive gradient
- Equation of a line $y = mx \pm c$ - negative gradient
- Equation of a line $y = mx \pm c$
- Equation of a line $ax + by = c$
- MIXTURE

Linear graphs · Equations of Parallel lines 5

- Equation of a parallel line - through (0,a)
- Equation of a parallel line - through (0,a) (rearranging)

Linear graphs · Equations of Parallel lines *continued*

- Equation of a parallel line - through (a,b)
- Equation of a parallel line - through (a,b)(rearranging)
- MIXTURE - parallel lines

Linear graphs · Equations of Perpendicular lines 5

- Equation of a perpendicular line - through (0,a)
- Equation of a perpendicular line - through (0,a) (rearranging)
- Equation of a perpendicular line - through (a,b)
- Equation of a perpendicular line - through (a,b) (rearranging)
- MIXTURE - Perpendicular lines

Linear graphs · Parallel and Perpendicular lines mixture 3

- Parallel and perpendicular mixture
- Parallel and perpendicular mixture
- MIXTURE

Non linear graphs · Quadratic Graphs 13

- Quadratic graphs - points to plot
- State the vertex of a quadratic graph
- Complete the square and find the vertex
- Complete the square and find the vertex
- Symmetry $y = (x \pm a)(x \pm b)$
- Symmetry $y = x^2 \pm bx \pm c$
- Symmetry $y = ax^2 \pm bx \pm c$
- Roots $y = x^2 \pm bx \pm c$
- Roots $y = ax^2 \pm bx \pm c$
- Identify the roots from a graph
- Identify the vertex from a graph
- Solve $x^2 \pm ax \pm b = \pm c$ from a graph
- MIXTURE - quadratic graphs

Non linear graphs · Equations of Circles 13

- Finding the equation of a circle
- Find the radius $x^2 + y^2 = r^2$
- Find the diameter $x^2 + y^2 = r^2$
- Find the radius $x^2 + y^2 - r^2 = 0$
- Find the diameter $x^2 + y^2 - r^2 = 0$
- Values of x where the circle crosses the x-axis
- Positive y-axis intercept
- Points $(a, 0)$ and $(b, 0)$ on the circle
- Points $(0, a)$ and $(0, b)$ on the circle
- Point (x, a) on the circle
- MIXTURE - circles
- Equation of a tangent to a circle
- MIXTURE - circles and tangents

Non linear graphs · Using Trigonometric Graphs 5

- Using the sine graph
- Using the cosine graph
- Using the tangent graph
- MIXTURE - sine and cosine graphs
- MIXTURE - sine, cosine and tangent graphs

Sketching · Sketching Graphs 4

- Sketching graphs parallel to the axes
- Sketching $y = x^2 \pm bx \pm c$
- Sketching graphs - mixture (1)
- MIXTURE - Sketching graphs

Transforming Graphs · Sketching Graphs 14

- Translation (-ve y)
- Translation (-ve x)
- Translation (+ve x)
- Reflection (x-axis)
- Reflection (y-axis)
- Stretch (parallel to the y-axis)

Transforming Graphs · Sketching Graphs *continued*

Stretch (parallel to the x-axis)
Translation -ve x and +ve y
Translation -ve x and -ve y
Translation +ve x and +ve y
Translation +ve x and -ve y
Reflection and stretch
Stretch and translation
MIXTURE - Sketching transformations

Transforming Graphs · New max/min 12

Translation (+ve y)
Translation (-ve y)
Translation (-ve x)
Translation (+ve x)
Reflection (x-axis)
Reflection (y-axis)
Stretch (parallel to the y-axis)
Stretch (parallel to the x-axis)
Translation -ve x and +ve y
Translation -ve x and -ve y
Translation +ve x and +ve y
MIXTURE - Transforming Graphs

Identities

Missing values 13

$mx + n \equiv mx + ka$
$mx + n \equiv kax + n$
$m(x + n) \equiv mx + ka$
$m(nax + c) \equiv px + q$
$m(nx + b) \equiv ax + c$
$m(ax + n) \equiv px + qb$
$(x + p)(x + q) \equiv x^2 + ax + b$
$(cx + d)(ax + e) \equiv px^2 + qx + b$
Mixture
$ax + b + cx + d \equiv ex + f$
$a(bx + c) + d(ex + f) \equiv gx + h$
Mixture (a and b)
MIXTURE - all

Indices

Simplifying 12

Simplify $a \times a \times a \times a$
Simplify $a^3 \times a \times a^4$
Multiplying terms $ax^m \times bx^n$
Dividing terms $a^n \div a^m$
Dividing terms $ax^n y^m \div cx$
Simplifying $(ax^n)^m$
Simplifying $(a^m b^n c^p)^q$
Simplifying -mixture (3 & 4)
Simplifying -mixture (3 & 6)
Simplifying -mixture
Simplifying $(ax^2 \times bx^4 \times cx$
MIXTURE - all

Finding missing powers 4

Addition law - missing power $x^n \times x^m = x^p$
Subtraction law - missing power $x^n \div x^m = x^p$
Raising to a power - missing power $(x^n)^m = x^p$
MIXTURE - mixture

Solving equations 8

Solving $\boxed{?}^{\frac{n}{2}} = \frac{1}{m}$
Solving $\boxed{?}^{\frac{n}{2}} = m$
Solving $\boxed{?}^{\frac{n}{3}} = \frac{1}{m}$

Solving equations *continued*

Solving $\boxed{?}^{\frac{n}{2}} = m$
Solving $\boxed{?}^{-\frac{n}{2}} = m$
Solving $\boxed{?}^{-\frac{n}{3}} = m$
Solving $a^m \times b^{\boxed{?}} = m$
MIXTURE - solving

Inequalities

Linear inequalities – listing solutions · Linear – listing integer solutions 27

Inequalities : $a < x < b$
Inequalities : $a \leq x < b$
Inequalities $a < x \leq b$
Inequalities $a \leq x \leq b$
Inequalities mix (1)
Inequalities $a < mx < b$
Inequalities $a \leq mx < b$
Inequalities $a < mx \leq b$
Inequalities $a \leq mx \leq b$
Inequalities mix (2)
Inequalities $a < mx + c < b$
Inequalities $a \leq mx + c < b$
Inequalities $a < mx + c \leq b$
Inequalities $a \leq mx + c \leq b$
Inequalities mix (3)
Inequalities $a < mx - c < b$
Inequalities $a \leq mx - c < b$
Inequalities $a < mx - c \leq b$
Inequalities $a \leq mx - c \leq b$
Inequalities mix (4)
Inequalities $a < c - mx < b$
Inequalities $a \leq c - mx < b$
Inequalities $a < c - mx \leq b$
Inequalities $a \leq c - mx \leq b$
Inequalities mix (5)
Inequalities mix (6)
MIXTURE - all

Linear inequalities – listing solutions · Smallest – largest solution 5

Integers Smallest value $ax + b > c$
Integers Smallest value $ax - b > c$
Integers Largest value $ax - b < c$
Integers Largest value $ax + b < c$
MIXTURE - Integer solutions - mixture

Linear inequalities · Solving linear inequalities 32

Solving : $x + a <> b$
Solving : $x - a <> b$
Solving $x \pm a <> b$
Solving $ax + b <> c$
Solving $ax - b <> c$
Solving $ax \pm b <> c$
Solving $\frac{x}{a} - b <> c$
Solving $\frac{x}{a} + b <> c$
Solving $\frac{x+a}{b} <> c$
Solving $\frac{x-a}{b} <> c$
Solving $a(bx + c) <> d$
Solving $a(bx - c) <> d$
Solving $a(bx \pm c) <> d$
Mixture (1)
Solving $a(b - cx) <> d$
Solving $a - \frac{x}{a} <> d$
Solving $\frac{a-x}{b} <> d$
Solving mixture (2)
Solving mixture (3)

Linear inequalities · Solving linear inequalities *continued*

Solving $ax + b < cx + d$
Solving $ax - b < cx + d$
Solving $ax + b < cx - d$
Solving $ax - b < cx - d$
Solving $ax + b < d - cx$
Solving $ax - b < d - cx$
Solving Mixture (4)
Solving Mixture (5 inc negative solutions)
Solving $a < bx + c < d$
Solving $a < bx - c < d$
Solving $a < b - cx < d$
Solving Mixture (6)
MIXTURE - all

Linear inequalities · Equations and Inequalities 1

Equations and inequalities mixture

Quadratic Inequalities · Answers as inequalities a = 1 9

Solving $x^2 - bx + c \geq 0$
Solving $x^2 - bx + c \leq 0$
Solving $x^2 - bx - c \geq 0$
Solving $x^2 - bx - c \leq 0$
Solving $x^2 + bx - c \geq 0$
Solving $x^2 + bx - c \leq 0$
Solving $x^2 + bx + c \geq 0$
Solving $x^2 + bx + c \leq 0$
MIXTURE - quadratic inequalities (1)

Quadratic Inequalities · Answers as inequalities a > 1 9

Solving $ax^2 - bx + c \geq 0$
Solving $ax^2 - bx + c \leq 0$
Solving $ax^2 - bx - c \geq 0$
Solving $ax^2 - bx - c \leq 0$
Solving $ax^2 + bx - c \geq 0$
Solving $ax^2 + bx - c \leq 0$
Solving $ax^2 + bx + c \geq 0$
Solving $ax^2 + bx + c \leq 0$
MIXTURE - quadratic inequalities (2)

Quadratic Inequalities · Answers on a number line 9

Represent $x^2 - bx + c \geq 0$ or > 0
Represent $x^2 - bx + c \leq 0$ or < 0
Represent $x^2 - bx - c \geq 0$ or > 0
Represent $x^2 - bx - c \leq 0$ or < 0
Represent $x^2 + bx - c \geq 0$ or > 0
Represent $x^2 + bx - c \leq 0$ or < 0
Represent $x^2 + bx + c \geq 0$ or > 0
Represent $x^2 + bx + c \leq 0$ or < 0
MIXTURE - Representing on a number line

Quadratic Inequalities · Answers on a number line a > 1 9

Represent $ax^2 - bx + c \geq 0$ or > 0
Represent $ax^2 - bx + c \leq 0$ or < 0
Represent $ax^2 - bx - c \geq 0$ or > 0
Represent $ax^2 - bx - c \leq 0$ or < 0
Represent $ax^2 + bx - c \geq 0$ or > 0
Represent $ax^2 + bx - c \leq 0$ or < 0
Represent $ax^2 + bx + c \geq 0$ or > 0
Represent $ax^2 + bx + c \leq 0$ or < 0
MIXTURE - Representing on a number line (a > 1)

Representing inequalities · Defining shaded regions 15

Representing :$y \leq a$ or $y < a$
Representing :$y \geq a$ or $y > a$
Representing $x \leq a$ or $x < a$
Representing $x \geq a$ or $x > a$

Representing inequalities · Defining shaded regions *continued*

Representing $ax + by \leq c$ or $ax + by < c$
Representing $ax + by \geq c$ or $ax + by > c$
Representing $ax + by \leq c$ and axes bounds
Representing $ax + by \geq c$ axes bounds
Representing $ax + by \leq c, x \geq p, y \geq 0$
Representing $ax + by \geq c, x \leq p, y \leq 0$
Representing $ax + by \leq c, x \geq 0, y \geq p$
Representing $ax + by \geq c, x \leq 0, y \leq p$
Representing $ax + by \leq c, x \geq p, y \geq q$
Representing $ax + by \geq c, x \leq p, y \leq q$
MIXTURE - representing (1)

Representing inequalities · Defining unshaded regions 15

Representing $y \geq a$ or $y > a$
Representing $y \leq a$ or $y < a$
Representing $x \geq a$ or $x > a$
Representing $x \leq a$ or $x < a$
Representing $ax + by \geq c$ or $ax + by > c$
Representing $ax + by \leq c$ or $ax + by < c$
Representing $ax + by \geq c$ and axes bounds
Representing $ax + by \leq c$ and axes bounds
Representing $ax + by \geq c, x \leq p, y \leq 0$
Representing $ax + by \leq c, x \geq p, y \geq 0$
Representing $ax + by \geq c, x \leq 0, y \leq p$
Representing $ax + by \leq c, x \geq 0, y \geq p$
Representing $ax + by \leq c, x \geq p, y \geq q$
Representing $ax + by \geq c, x \leq p, y \leq q$
MIXTURE - representing (2)

Sequences

Linear sequences · Counting patterns and continuing 10

Counting in 50's
Continue a linear sequence (integers)
Continue a linear sequence (integers)
Counting in tenths
Counting in tenths (diff > 1)
Counting in tenths hundredths
Directed numbers
Continue a sequence mixture
Recognise a linear sequence
MIXTURE - patterns/continuing

Linear sequences · Missing terms 6

Missing terms - linear sequences
Missing terms - tenths
Missing terms - hundredths
Missing terms - directed numbers
Find the first term - mixed sequences
MIXTURE - missing terms

Mixed Sequences · Generating sequences 7

Generate a sequence given the first term and rule (+)
Generate a sequence given the first term and rule (-)
Generate a sequence given the first term and rule
Generate a geometric sequence given the first term and rule
Generate a sequence (fractions) - nth term
Generate a sequence iterative formula
MIXTURE - generating a sequence

nth term · Linear 10

Generate sequences given an algebraic rule
Generate an increasing sequence - nth term
Generate a decreasing sequence - nth term

nth term · Linear *continued*

Generate a linear sequence - nth term
Find the nth term linear - inc
Find the nth term linear - dec
Find the nth term linear - mixture
Find the nth term fractions
Find and use the nth term linear - non calculator
MIXTURE - nth term

nth term · Quadratic 3

Generate a quadratic sequence - nth term
Find the nth term quadratic
Find the 10th term - quadratic

nth term · Mixed sequences 2

Find the nth term mixture - linear/quadratic
Find the nth term mixture - linear/quadratic/fractions

Mixed Sequences · Missing terms and continuing 8

Continue a Fibonacci sequence
Continue a geometric sequence
Finding specific terms in a geometric sequence
Finding the next term of a non-linear sequence
Find missing terms in a geometric sequence
Fractions and sequences
Algebraic sequences
MIXTURE - non linear

Simplifying

Collecting like terms 15

Collecting like terms-addition
Collecting like terms - Single variable
Collecting like terms - Single variable (across 0)
Collecting like terms $ax + b + cx + d$
Collecting like terms $ax + b + cx - d$
Collecting like terms $ax + b - cx + d$
Collecting like terms $ax - b + cx + d$
Collecting like terms $ax + b - cx - d$
Collecting like terms $ax - b + cx + d$
Collecting like terms $ax - b - cx + d$
Collecting like terms $ax - b - cx - d$
Collecting like terms - mixture
Collecting like terms - Two variables
Collecting like powers of a variable
MIXTURE - all

Multiplying and dividing 6

Multiplying terms $x \times a$
Multiplying terms $a \times x \times b \times x$
Multiplying terms $ax \times bx$
Dividing terms $x \div a$
Dividing terms $ax \div b$
MIXTURE - multiplying and dividing

Basic notation 1

Simple expressions

Multiple single brackets 11

Expanding : $a(bx + c) + d(ex + f)$
Expanding : $a(bx - c) + d(ex + f)$
Expanding $a(bx + c) + d(ex - f)$
Expanding $a(bx - c) + d(ex - f)$
Expanding Mixture (1)
Expanding $a(bx + c) - d(ex + f)$
Expanding $a(bx - c) - d(ex + f)$
Expanding $a(bx + c) - d(ex - f)$
Expanding $a(bx - c) - d(ex - f)$

Multiple single brackets *continued*

Expanding Mixture (2)
MIXTURE - multiple single brackets

Algebraic fractions 16

Simplify : $\frac{x}{a} + \frac{x}{b}$
Simplify : $\frac{x}{a} - \frac{x}{b}$
Simplify $\frac{ax}{b} + \frac{cx}{d}$
Simplify $\frac{ax}{b} - \frac{cx}{d}$
Simplify $\frac{x+a}{b} + \frac{x+c}{d}$
Simplify $\frac{x+a}{b} - \frac{x+c}{d}$
Simplify $\frac{x+a}{b} - \frac{x-c}{d}$
Simplify $\frac{x-a}{b} - \frac{x+c}{d}$
Simplify $\frac{x-a}{b} - \frac{x-c}{d}$
Simplify $\frac{x-a}{b} + \frac{x-c}{d}$
Simplify $\frac{x+a}{b} - \frac{x-c}{d}$
Simplify Mixture (1)
Multiplying algebraic fractions
Dividing algebraic fractions
Rational expressions
MIXTURE - all

Substitution

Substitution – Positive integers · Linear and fractions 21

Substitution : $x + a$
Substitution : $x - a$
Substitution ax
Substitution $\frac{a}{x}$
Substitution one step
Substitution $ax + b$
Substitution $ax - b$
Substitution $b - ax$
Substitution $\frac{x}{a} + b$
Substitution $\frac{x+a}{b}$
Substitution $\frac{x-a}{b}$
Substitution two step
Substitution $y = ax + b$
Substitution $y = ax - b$
Substitution $y = b - ax$
Substitution $y = \frac{x}{a} + b$
Substitution $y = \frac{x+a}{b}$
Substitution $y = \frac{x-a}{b}$
Substitution $y = \frac{ax+b}{c}$
Substitution $y = \frac{ax-b}{c}$
MIXTURE - linear

Substitution – Positive integers · Quadratic 16

Substitution $y = ax^2$
Substitution $y = x^2 \pm b$
Substitution $y = ax^2 + b$
Substitution $y = ax^2 - b$
Substitution $y = b - ax^2$
Substitution $y = (ax)^2 + b$
Substitution $y = \frac{ax^2}{b}$
Substitution $y = \frac{ax^2}{b} + c$
Substitution $y = \frac{ax^2}{b} - c$
Substitution $y = x^2 \pm x$
Substitution $y = ax^2 \pm x$
Substitution $y = x^2 \pm ax$
Substitution $y = ax^2 \pm bx$
Substitution $y = x^2 \pm bx + c$
Substitution $y = bx - ax^2 \pm c$
MIXTURE - quadratic

Substitution – Positive integers · Square roots 8

Substitution $y = \sqrt{b - ax}$
Substitution $y = a\sqrt{x} + b$

Substitution – Positive integers · Square roots *continued*

Substitution $y = b - a\sqrt{x}$
Substitution $y = \sqrt{\frac{x+a}{b}}$
Substitution $y = \sqrt{\frac{x-a}{b}}$
Substitution $y = \sqrt{b(ax+c)}$
Substitution $y = \frac{a}{\sqrt{x+b}}$
MIXTURE - roots

Substitution – Positive integers · Cubic 1

Substitution $y = ax^3 \pm bx^2 \pm cx \pm d$

Substitution – Negative Integers · Linear 15

Negative integers : $y = x + a$
Negative integers : $y = x - a$
Negative integers $y = a - x$
Negative integers $y = ax$
Negative integers $y = \frac{x}{a}$
Negative integers $y = \frac{a}{x}$
Negative integers $y = ax + b$
Negative integers $y = ax - b$
Negative integers $y = b - ax$
Negative integers $y = \frac{x}{a} + b$
Negative integers $y = \frac{x+a}{b}$
Negative integer{ $y = \frac{x-a}{b}$
Negative integers $y = \frac{ax+b}{c}$
Negative integers $y = \frac{ax-b}{c}$
MIXTURE - negative integers

Substitution – Negative Integers · Quadratic 17

Squaring and cubing
Negative integers $y = x^2 \pm b$
Negative integers $y = ax^2 + b$
Negative integers $y = ax^2 - b$
Negative integers $y = b - ax^2$
Negative integers $y = (ax)^2 + b$
Negative integers $y = \frac{ax^2}{b}$
Negative integers $y = \frac{ax^2}{b} + c$
Negative integers $y = \frac{ax^2}{b} - c$
Negative integers $y = x^2 \pm x$
Negative integers $y = ax^2 \pm x$
Negative integers $y = x^2 \pm ax$
Negative integers $y = ax^2 \pm bx$
Negative integers $y = x^2 \pm bx \pm c$
Negative integers $y = bx - ax^2 \pm c$
Negative integers Quadratic Mixture
MIXTURE - Linear/Quadratic Mixture

Substitution – Negative Integers · Square roots 6

Negative integers $y = \sqrt{ax+b}$
Negative integers $y = \sqrt{b-ax}$
Negative integers $y = \sqrt{\frac{x+a}{b}}$
Negative integers $y = \sqrt{b(x-a)}$
Negative integers $y = \frac{a}{\sqrt{x+b}}$
MIXTURE - negative numbers/roots

Substitution – Negative Integers · Cubic 3

Negative integers $y = ax^3 \pm bx^2$
Negative integers $y = ax^3 \pm bx^2 \pm cx \pm d$
MIXTURE - negative numbers/cubic

Substitution – Mixture 5

Substitution one-step mixture + -
Substitution mixture inc quadratic + -
Substitution cubic formula + -
Substitution fractional and negative values
MIXTURE - all

Substitution – Fractions 6

Fractions : $y = ax + b$
Fractions : $y = b - ax$
Fractions $y = a(x \pm b)$
Fractions $y = ax^2 \pm b$
Fractions $y = ax^2 \pm bx$
MIXTURE - fractions

Using SUVAT formulae 15

Calculating the initial velocity $v = u + at$
Calculating the acceleration $v = u + at$
Calculating the time $v = u + at$
Calculating the velocity $v = u + at$
Mixture $v = u + at$
Calculating the initial velocity $s = ut + \frac{1}{2}at^2$
Calculating the displacement $s = ut + \frac{1}{2}at^2$
Mixture $s = ut + \frac{1}{2}at^2$
Calculating the initial velocity $v^2 = u^2 + 2as$
Calculating the displacement $v^2 = u^2 + 2as$
Mixture $v^2 = u^2 + 2as$
Mixture
Using $s = \frac{1}{2}(u+v)t$
Using $v^2 = u^2 + 2as$
MIXTURE - suvat

03 SECONDARY Geometry & Measures

103 topics
697 structures

Measures

Compound Measures – Speed · Speed, Distance & Time – non-calculator 6

Speed Distance Time - speed
Speed Distance Time - distance
Speed Distance Time - time
Speed Distance Time - time or distance
Mixture (full hours only)
MIXTURE - Speed Distance Time

Compound Measures – Speed · Speed, Distance & Time – calculator 6

Speed Distance Time - speed - calculator
Speed Distance Time - distance - calculator
Speed Distance Time - time - calculator
Speed Distance Time - Mixture - calculator
Average speed problems - calculator
MIXTURE - speed/distance/time calculator

Compound Measures – Speed · Converting – Speed 7

Converting units of speed m/s to km/h
Converting units of speed km/h to m/s
Converting units of speed (1)

Compound Measures – Speed · Converting – Speed *continued*

- Converting units of speed km/h to mph
- Converting units of speed mhp to km/h
- Converting units of speed (2)
- MIXTURE - units of speed all

Compound Measures – Density/Pressure · Mass, Volume & Density 4

- Density mass volume - density
- Density mass volume - mass
- Density mass volume - volume
- MIXTURE - Density mass volume

Compound Measures – Density/Pressure · Converting – Density 3

- Converting units of density
- Converting units of density
- MIXTURE - density mixture

Compound Measures – Density/Pressure · Area, Force & Pressure 4

- Pressure Force and Area - pressure
- Pressure , Force and Area - force
- Pressure , Force and Area - area
- MIXTURE - Pressure , Force and Area

Compound Measures – Density/Pressure · Population, Area & Density 4

- Population Density - density
- Population Density - population
- Population Density - area
- MIXTURE - Population Density

Compound Measures – Density/Pressure · Mixed 1

- Speed and density mixture

Rates 1

- Converting units of rates of flow

Time 23

- Time from a digital clock
- am and pm when comparing times
- Understanding the order of the months
- Converting : years months days
- Converting : weeks days hours
- Converting hours minutes
- Converting time mixture
- Minutes and seconds as seconds
- Seconds as minutes and seconds
- Comparing seconds and minutes and seconds
- Comparing time intervals
- Calculate the time after - minutes
- Calculate the time - before
- Calculate the time Mixture
- Calculating time intervals (5 minutes)
- Calculating time intervals
- Working out end times
- Working out start times
- Mixture -start/ed times mixture
- Decimal hours to hours and minutes
- Hours and minutes to decimals hours
- Using a calendar
- MIXTURE - time

Metric Measures · Metric measures – length 12

- Equivalence - m and cm
- Equivalence - m and cm (decimals)

Metric Measures · Metric measures – length *continued*

- Equivalence - cm and mm
- Equivalence - cm and mm (decimals)
- Equivalence - length mixture
- Addition - mixed lengths
- Subtraction - mixed lengths
- Subtraction - mixed lengths
- Comparing - km and m
- Comparing - mixed units
- Ordering - mixed units
- MIXTURE - lengths

Metric Measures · Metric measures – mass 4

- Comparing - mixed measures
- Addition - mixed measures
- Subtraction - mixed measures
- MIXTURE - mass

Metric Measures · Metric measures – Capacity 5

- Equivalence ml and litres
- Equivalence ml ,cl and litres
- Addition- mixed measures
- Subtraction - mixed measures
- MIXTURE - capacity

Metric Measures · Mixed metric measures 7

- Mixed Equivalence - kg and km
- Mixed Equivalence - ml and mm
- Equivalence - mixed measures
- Equivalence - mixed measures
- Addition of mixed metric measures
- Rounding measures
- MIXTURE - mixed measures

Metric Measures · Metric measures – Area 3

- mm^2 and cm^2
- cm^2 and m^2
- MIXTURE - units of area

Metric Measures · Metric measures – Volume 3

- mm^3 and cm^3
- cm^3 and m^3
- MIXTURE - units of volume - mixture

Imperial Measures 5

- Miles and km
- Inches and cm
- Kilograms and pounds
- Pints and gallons
- MIXTURE - imperial measures

Angles

Angles facts · Basic Facts 8

- Classifying angles
- Angles (degrees) - clocks hands 5 mins intervals
- Angles on a straight line
- Angles on a straight line
- Angles at a point
- Angles at a point
- Vertically Opposite Angles
- MIXTURE Angle facts

Angles facts · Parallel lines 10

- Vertically Opposite Angles
- Corresponding angles
- Allied/co-interior angles
- Alternate angles

Angles facts · Parallel lines *continued*

- Parallel lines Mixture (8-10)
- Parallel lines
- Parallel lines
- Parallel lines
- Parallel lines
- MIXTURE - Parallel lines

Angles in polygons · Angles in polygons (1) 15

- Angles in a triangle
- Angles in an isosceles triangle
- Angles in an isosceles triangle
- Angles in a right angled triangle
- Angles triangles - mixture
- Calculate missing angles triangles
- Calculate angles in a quadrilateral
- Quadrilateral and triangle - mixture
- Interior angles - angle
- Interior angles - No. sides
- Interior angles - total
- Exterior angles - polygons
- Interior/Exterior - mixed questions
- Angles in polygons - with diagrams
- MIXTURE - angles in polygons (1)

Angles in polygons · Angles in polygons (2) 7

- Interior angles in an arithmetic sequence
- Largest angle in a trapezium
- Decreasing arithmetic sequence of angles
- Three regular polygons at a point
- Area of part of a regular octagon
- Isosceles triangle angle
- MIXTURE - angles in polygons (2)

Angles facts · Mixed questions 2

- Basic facts and triangles mixture
- Basic facts/triangles/parallel lines mixture

Bearings 7

- Compass directions and right angles
- Bearings -words
- Bearings - from A to B
- Bearings - from B to A
- Bearings - from A to B
- Bearings - from B to A
- MIXTURE - Bearings

Area

Area – non calculator · Area – Squares and Rectangles 8

- Square - Area
- Square - side length - area known
- Square - area - perimeter known
- Rectangle - area
- Rectangle - side length
- Rectangle - area - perimeter known
- Rectangle - perimeter - area known
- MIXTURE - rectangles

Area – non calculator · Area – Triangles 10

- Right angled triangle - area
- Right angled triangle - base - area known
- Right angled triangle - height - area known
- Non right-angled triangle - area
- Non right-angled triangle - base - area known
- Non right-angled triangle - height - area known
- Obtuse-angled triangle - area

Area – non calculator · Area – Triangles *continued*

- Obtuse-angled triangle - base - area known
- Obtuse-angled triangle - height - area known
- MIXTURE - triangles

Area – non calculator · Area – Parallelograms 4

- Parallelogram area
- Parallelogram - base - area known
- Parallelogram - height - area known
- MIXTURE - parallelograms

Area – non calculator · Area – Trapeziums 4

- Trapezium - area
- Trapezium - base - area known
- Trapezium - height - area known
- MIXTURE - trapeziums

Area – non calculator · Area – Circles 9

- Circle - area - radius known
- Circle - area - diameter known
- Circle - area - mixture
- Circle - area - mixture - no diagram
- Semi-circle - area
- Sector - area
- Sector - radius - area known
- Sector - angle - area known
- MIXTURE - circles/sectors (non calc)

Area – non calculator · Area – circles and sectors – no diagrams 9

- Circle - area - radius known
- Circle - area- diameter known
- Circle area - mixture
- Area of a circles and semi circles
- Sector - area
- Sector - radius - area known
- Sector - angle - area known
- Sector - mixture
- MIXTURE - circles/sectors

Area – non calculator · Area – Compound shapes/mixed 7

- Mixed area (no circles)
- Trapezium - base - area known
- Mixed area (inc circles)
- Compound shapes - missing length
- Compound shapes - area - 1 missing length
- Compound shapes - area - 2 missing lengths
- MIXTURE Compound shapes

Area – non calculator · Area – Mixture – no diagrams 10

- Area of a rectangle
- Height of a rectangle
- Area of a rectangle mixture
- Area of a triangle
- Area of a triangle - missing length
- Area of a triangle - mixture
- Area of a parallelogram
- Area of a parallelogram - missing length
- Area of a trapezium
- MIXTURE - area

Area – calculator · Area – Squares and Rectangles 8

- Squares - area
- Squares - the side length - area known
- Squares - calculate the area - perimeter known
- Rectangle - area
- Rectangle - calculate the side length

Area – calculator · Area – Squares and Rectangles *continued*

Rectangle - calculate the area - perimeter known
Rectangle - calculate the perimeter - area known
MIXTURE - squares/rectangles

Area – calculator · Area – Triangles 10

Right angled triangle - area
Right angled triangle - base area known
Right angled triangle - height area known
Non right-angled triangle - area
Non right-angled triangle - base - area known
Non right-angled triangle - height - area known
Obtuse-angled triangle area
Obtuse-angled triangle - base - area known
Obtuse-angled triangle - height - area known
MIXTURE - triangles

Area – calculator · Area – Parallelograms 4

Parallelogram - area
Parallelogram - base - area known
Parallelogram - height - area known
MIXTURE - parallelograms

Area – calculator · Area – Trapeziums 4

Trapezium - area
Trapezium - base - area known
Trapezium - height - area known
MIXTURE - trapeziums

Area – calculator · Area – Compound shapes 4

Compound shapes - missing length
Compound shapes - area
Compound shapes - Area
MIXTURE - compound shapes

Area – calculator · Area – Circles 8

Area of a circle - radius known
Area of a circle - diameter known
Area of a circle - mixture
Area of a semi-circle
Area of a sector
Radius of a sector - area known
Angle of a sectors - area known
MIXTURE - circles and sectors

Area – calculator · Area – Circles Shaded Area Problems 7

Shaded Area 1
Shaded Area 2
Shaded Area 3
Shaded Area 4
Shaded Area 5
Shaded Area 6
MIXTURE - shaded areas

Area – calculator · Area – Circles no diagrams 8

Area of a circle - radius known
Area of a circle - diameter known
Area of a circle mixture
Area of a sector - calc
Area of a sector - radius
Area of a sector - angle
Area of a sector - mixture
MIXTURE - circles and sectors

Area – calculator · Area – mixed no diagrams 7

Area of a rectangle
Height of a rectangle

Area – calculator · Area – mixed no diagrams *continued*

Area of a rectangle mixture
Area of a triangle
Area of a triangle - missing length
Area of a triangle - mixture
MIXTURE - rectangles/triangles

Area and perimeter · Area and Circumference mixtures 2

Area and circumference of circle - non- calc
Area and circumference of circles - calc

Area and perimeter · Non calculator 2

Area and perimeter mixture
Area and circumference of circles - non calc

Area of a segment 3

Segment area from radius and angle
Major segment (unshaded)
MIXTURE - area/segments

Perimeter

Area and perimeter · Calculator 2

Area and circumference of circles - calc
MIXTURE

Area and perimeter · Non calculator 3

Area and perimeter mixture
Area and circumference of circles - non calc
MIXTURE - area/perimeter - non calc

Perimeter – non calculator · Perimeter – Squares and Rectangles 12

Perimeter of a square
Squares - area - perimeter known
Squares - perimeter - area known
Squares - side length - perimeter known
Rectangle - perimeter
Rectangle - area - perimeter known
Rectangle - perimeter - area known
Rectangle - side length - area known
Rectangle - perimeter
Rectangle - side length - perimeter known
Rectangle - perimeter - area known
MIXTURE - perimeter squares/rectangles

Perimeter – non calculator · Perimeter – other polygons 4

Perimeter - square, rectangle and equilateral triangle
Regular polygons - perimeter
Regular polygons - side length - perimeter known
MIXTURE - perimeter

Perimeter – non calculator · Perimeter – Compound Shapes 3

Perimeter - compound shapes - 1 length missing
Perimeter - compound shapes - 2 lengths missing
MIXTURE - perimeter - compound shapes

Perimeter – calculator · Perimeter – Squares and Rectangles 9

Squares - perimeters
Squares - perimeter - area known
Squares - side length - perimeter known
Rectangle - perimeter of a rectangle
Rectangle - perimeter - area known
Rectangle - side length - perimeter known

Perimeter – calculator · Perimeter – Squares and Rectangles *continued*

Rectangle - rectangle - no diagram
Rectangle - side length - perimeter known - no diagram
MIXTURE - rectangles/squares - perimeter

Perimeter – calculator · Perimeter – Regular Polygons 4

Perimeter - square, rectangle and equilateral triangle
Perimeter of regular polygons
Side length - perimeter known
MIXTURE - perimeter polygons mixture

Perimeter – calculator · Perimeter – Compound Shapes 1

Compound shapes - perimeter

Perimeter – non calculator · Circles – cirumference 10

Circles - circumference - radius known
Circles - circumference - diameter known
Circles - circumference - mixture
Semi-circle - perimeter
Sector - arc length
Sector - radius - arc length known
Sector - angle - arc length known
Sector - mixture
Sector - perimeter
MIXTURE - circles and sectors (1)

Perimeter – non calculator · Circles – cirumference– no diagrams 6

Circles - circumference - radius known
Circles - circumference - diameter known
Circles - circumference - mixture
Sector - arc length
Sector - perimeter
MIXTURE - circles and sectors (2)

Perimeter – calculator · Circumference 12

Circle - circumference - radius known
Circle - circumference - diameter known
Circle - circumference - mixture
Semi-circle - perimeter
Sectors - arc length
Sector - radius - arc length known
Sectors - angle - arc length known
Sectors - radius
Sectors - mixtures
Sector - perimeter
Area and circumference of circle - mixture
MIXTURE - circles and sectors (3)

Perimeter – calculator · Circumference – no diagrams 6

Circle - circumference - radius known
Circle - circumference - diameter known
Circle - circumference - mixture
Sectors - arc length
Sector - perimeter
MIXTURE - circles and sectors (4)

Coordinates

Coordinates 5

1st quadrant
2nd Quadrant
3rd Quadrant
4th Quadrant
All 4 Quadrants

Pythagoras

Pythagoras – calculator · With Diagrams 12

Pythagoras - hypotenuse
Pythagoras - shorter side
Pythagoras - any side
Pythagoras - any side - non calculate
Height - equilateral triangle
Slant height - isosceles triangle
Height - isosceles triangle
Perimeter - isosceles triangle
Area - isosceles triangle
Length of a diagonal
Distance between 2 points
MIXTURE - Pythagoras problems

Pythagoras – calculator · No diagrams 6

Calculating c in $a^2 + b^2 = c^2$
Calculating a in $a^2 + b^2 = c^2$
Calculating b in $a^2 + b^2 = c^2$
Calculating the distance between 2 points
Compass directions and distance
MIXTURE - Pythagoras - calculator

Pythagoras – Non-Calculator 3

Calculating any side - exact
Distance between 2 points
MIXTURE - Pythagoras - non-calculator

3D Pythagoras 3

Space diagonal of a cuboid
Pyramid slant height
MIXTURE - Pythagoras 3D

Similarity

Similarity – Length 9

Using scale factors - simple
Missing lengths - similar rectangles (1)
Missing lengths - similar rectangles (2)
Calculating missing sides in similar shapes
Enlargement - lengths mixture
Enlargement - finding the new length
Enlargement - finding the original length
Enlargement - mixture - length
MIXTURE - similarity - lengths

Similarity – Area 4

Enlargement - area - mixture
Enlargement - finding the new area
Enlargement - finding the original area
MIXTURE - area mixture

Similarity – Volume 3

Enlargement - finding the new volume
Enlargement - finding the original volume
MIXTURE - volume mixture

Similarity – Mixture 2

Enlargement - area and volume mixture
Enlargement - mixture

Trigonometry

Identifying sides and ratios 12

Identifying the sine ratio of an angle
Identifying the sine ratio of an angle
Identifying the sine ratio of an angle mix (1 - 2)

Identifying sides and ratios *continued*

- Identifying the cosine ratio of an angle
- Identifying the cosine ratio of an angle
- Identifying the cosine ratio of an angle mix (4 - 6)
- Identifying the tangent ratio of an angle
- Identifying the tangent ratio of an angle
- Identifying the tangent ratio of an angle mix (7 - 8)
- Identifying mixed ratios of angles
- Identifying mixed ratios of angles
- MIXTURE - all

Using a calculator 8

- Evaluating $\sin x$, $\cos x$, $\tan x$
- Trigonometry (1)
- Trigonometry (2)
- Trigonometry (3)
- Trigonometry Mixture (2 - 4)
- Cosine rule - finding an angle
- Cosine rule - finding an side
- MIXTURE - Cosine rule

Using basic ratios · Sine Ratio 15

- Sine ratio - calculating the opposite
- Sine ratio - calculating the opposite
- Sine ratio - calculating the opposite mix (1)
- Sine ratio - calculating the hypotenuse
- Sine ratio - calculating the hypotenuse
- Sine ratio - calculating the hypotenuse mix (2)
- Sine ratio - calculating sides
- Sine ratio - calculating sides
- Sine ratio - calculating sides mix (3)
- Sine ratio - calculating the angle
- Sine ratio - calculating the angle
- Sine ratio - calculating the angle mix (4)
- Sine ratio - calculating angles/sides
- Sine ratio - calculating angles/sides
- MIXTURE - calculating angles/sides

Using basic ratios · Cosine Ratio 15

- Cosine ratio - calculating the adjacent
- Cosine ratio - calculating the adjacent
- Cosine ratio - calculating the adjacent mix(1)
- Cosine ratio - calculating the hypotenuse
- Cosine ratio - calculating the hypotenuse
- Cosine ratio - calculating the hypotenuse mix (2)
- Cosine ratio - calculating sides
- Cosine ratio - calculating sides
- Cosine ratio - calculating sides mix (3)
- Cosine ratio - calculating the angle
- Cosine ratio - calculating the angle
- Cosine ratio - calculating the angle mix (4)
- Cosine ratio - calculating angles/sides
- Cosine ratio - calculating angles/sides
- MIXTURE - calculating angles/sides

Using basic ratios · Tangent Ratio 15

- Tangent ratio - calculating the opposite
- Tangent ratio - calculating the opposite
- Tangent ratio - calculating the opposite mix (1)
- Tangent ratio - calculating the adjacent
- Tangent ratio - calculating the adjacent
- Tangent ratio - calculating the adjacent mix (2)
- Tangent ratio - calculating sides
- Tangent ratio - calculating sides
- Tangent ratio - calculating sides mix (3)
- Tangent ratio - calculating the angle
- Tangent ratio - calculating the angle
- Tangent ratio - calculating the angle mix (4)
- Tangent ratio - calculating angles and sides

Using basic ratios · Tangent Ratio *continued*

- Tangent ratio - calculating angles and sides
- MIXTURE - calculating angles/sides

Using basic ratios · Mixed Ratios & Problems 6

- Mixed ratios - calculating angles
- Mixed ratios - calculating sides
- Mixed ratios - calculating angles and sides
- Trigonometry in 3D - Cuboid Problems
- Trigonometry in 3D - Pyramid Problems
- MIXTURE - Trigonometry in 3D

Sine & Cosine Rules · Sine Rule 7

- Sine rule - calculating an angle
- Sine rule - calculating an angle
- Sine rule - calculating an angle mix (1)
- Sine rule - calculating sides
- Sine rule - calculating sides
- Sine rule - calculating sides mix(2)
- MIXTURE - Sine rule

Sine & Cosine Rules · Cosine Rule 3

- Cosine rule - calculating an angle
- Cosine rule - calculating sides
- MIXTURE - Cosine rule

Sine & Cosine Rules · Mixture 3

- Sine and cosine rules calculating sides
- Sine and cosine rules calculating an angle
- MIXTURE - Sine and cosine rules

Area of a triangle · Sine and Area 7

- Calculating the Area
- Calculating the Area
- Calculating the area (1)
- Calculating an angle
- Calculating a side
- Side and angle mixture
- MIXTURE - area of a triangle/sine

Exact Values 3

- Stating Exact Trig Values
- Using Exact Trig Values
- MIXTURE - Exact Trig Values

Vectors

Column Vectors 5

- Column vectors - sum and difference
- Column vectors - missing values
- Column vectors mixture
- Writing as a column vector
- MIXTURE - column vectors

Vector Geometry 9

- Vector geometry
- Ratio $AP : PM$
- Vector $\overrightarrow{ON}$ in a trapezium
- Vector $\overrightarrow{OP}$ at an intersection
- Ratio $CD : DE$
- Ratio $AQ : QC$
- Vector $\overrightarrow{AC}$
- Vector $\overrightarrow{AN}$
- MIXTURE - vector geometry

Transformations

Transformations – Translation 3

- Translation - x direction
- Translation - y direction
- MIXTURE - Translation

Transformations – Reflection 13

- Reflection x = a
- Reflection y = a
- Reflection mix (1)
- Reflection y = x
- Reflection y = -x
- Reflection mix (2)
- Reflecting A
- Reflecting B
- Reflecting C
- Reflecting D
- Reflections - x - axis
- Reflections - y - axis
- MIXTURE - Reflections

Transformations – Rotation 4

- Rotation : $90°$ Clockwise
- Rotation : $90°$ Clockwise
- Rotation : $180°$ Anti-clockwise
- MIXTURE - Rotation

Transformations – Enlargement 8

- Enlargement : scale factor 2
- Enlargement : scale factor 2
- Enlargement scale factor 0.5
- Enlargement mix (1)
- Enlargement scale factor -2
- Enlargement scale factor -0.5
- Enlargement mix (2)
- MIXTURE - Enlargement

Transformations – Invariant points 4

- Rotation - one invariant vertex
- Transformation - two invariant vertices
- Reflections - one invariant vertex
- Invariant points mixture

Volume

Volume – with diagrams · Cuboids and Prisms 13

- Cuboid - volume
- Cuboid - missing lengths
- Triangular prism - volume
- Triangular prism - missing lengths
- Triangular prism - missing lengths
- Cylinder - volume - radius known
- Cylinder - volume - diameter known
- Cylinder - radius - volume known
- Cylinder - height - volume
- Triangular prism - volume
- Trapezoid prism -volume
- Prisms - volume - mixture
- MIXTURE - volume (1)

Volume – with diagrams – non calculator · Cuboids and Prisms – non calculator 13

- Cuboid - volume
- Cube - volume
- Cuboid - missing lengths
- Triangular prism - volume
- Triangular prism - missing lengths

Volume – with diagrams – non calculator · Cuboids and Prisms – non calculator

continued

- Triangular prism - find length
- Cuboids and triangular prisms mixture
- Cylinder - volume - radius known
- Cylinder - volume - diameter known
- Cylinder - radius - volume known
- Cylinder - height - volume known
- Cylinder mixture
- MIXTURE - volume (2)

Volume – with diagrams · Cones and Pyramids 8

- Cone - volume - height known
- Cone - volume - slant height known
- Cone - radius - volume known
- Cone - height - volume known
- Square based pyramid - volume
- Square based pyramid - height - volume known
- Square based pyramid - base length - volume known
- MIXTURE - cones/pyramids (1)

Volume – with diagrams – non calculator · Cones and Pyramids – non calculator 10

- Cone - volume - height known
- Cone - volume - slant height known
- Cone - radius - volume known
- Cone - height - volume known
- Cone mixture
- Square based pyramid - volume
- Square based pyramid - height - volume known
- Square based pyramid - base length - volume known
- Pyramid mixture
- MIXTURE - cones/pyramids (2)

Volume – with diagrams · Spheres and Hemispheres 9

- Sphere - volume - radius known
- Sphere - volume - diameter known
- Sphere - radius - volume known
- Sphere - diameter - volume known
- Hemisphere - volume - radius known
- Hemisphere - volume - diameter known
- Hemisphere - radius - volume known
- Hemisphere - diameter - volume known
- MIXTURE - sphere/hemisphere (1)

Volume – with diagrams – non calculator · Spheres and Hemispheres – non calculator 11

- Sphere - volume - radius known
- Sphere - volume - diameter known
- Sphere - radius - volume known
- Sphere - diameter - volume known
- Sphere mixture
- Hemisphere - volume - radius known
- Hemisphere - volume - diameter known
- Hemisphere - radius - volume known
- Hemisphere - diameter - volume known
- Hemisphere mixture
- MIXTURE - sphere/hemisphere (2)

Volume – no diagrams · Cuboids and prisms – non calc 6

- Cuboid - volume
- Cylinder - volume - diameter known
- Cylinder - volume - radius known
- Cylinder - volume - diameter known
- Cylinder - mixture
- Cylinder - Volume and surface area mixture

Volume – no diagrams · Cones and pyramids 4

Cones - volume - radius and slant height known
Cone - volume - mixture
Pyramid - volume
MIXTURE - pyramids/cones

Volume – no diagrams · Spheres and frustums 5

Sphere - volume
Sphere - volume - radius
Sphere - mixture
Frustum - volume
MIXTURE - spheres/frustums

Surface Area

Surface Area – with diagrams · Cuboids and prisms 10

Surface Area - Cuboid
Surface Area - Triangular prism
Triangular prism
Surface Area - Trapezoid prism
Surface Area - Prisms mixture
Curved SA - cylinder - radius
Curved SA - cylinder - diameter
Total SA - cylinder - radius
Total SA - cylinder - diameter
MIXTURE - surface area (1)

Surface Area – with diagrams – non calculator · Cuboids and prisms – non calculator 17

Surface Area - Cuboid
Surface Area - Cube
Cuboid - find height - SA known
Triangular prism
Triangular prism - find length - SA known
Cuboids and triangular prisms mixture
Curved SA - cylinder - radius
Curved SA - cylinder - diameter
Total SA - cylinder - radius
Total SA - cylinder - diameter
Curved SA - cylinder mixture
Total SA - cylinder mixture
Prisms and cylinders mixture
Cylinder - find height - curved SA known
Cylinder - find radius - total SA known
Cuboids, prisms and cylinders - full mixture
MIXTURE - surface area (2)

Surface Area – with diagrams · Cones and spheres 11

Cone - height known
Cone - slant height known
Sphere - radius known
Sphere - diameter known
Sphere - find radius
Sphere - find diameter
Hemisphere - radius known
Hemisphere - diameter known
Hemisphere - find radius
Hemisphere - find diameter
MIXTURE - surface area (3)

Surface Area – with diagrams – non calculator · Cones and spheres – non calculator 16

Cone - height known
Cone - slant height known
Cone - find radius - SA known

Surface Area – with diagrams – non calculator · Cones and spheres – non calculator *continued*

Cone - find slant height - SA known
Cone mixture
Sphere - radius known
Sphere - diameter known
Sphere - find radius
Sphere - find diameter
Sphere mixture
Hemisphere - radius known
Hemisphere - diameter known
Hemisphere - find radius
Hemisphere - find diameter
Hemisphere mixture
MIXTURE - surface area (4)

Surface Area – no diagrams · Cuboids and prisms 8

Cuboid
Cylinder - radius known
Cylinder - diameter known
Cylinder - surface area - non calculator
Cylinder Curved surface area - radius known
Cylinder Curved surface area - diameter known
Cuboids and cylinders - non calculator
MIXTURE - surface area (5)

Surface Area – no diagrams · Cones and spheres 3

Sphere
Find the radius of a sphere
Sphere mixture

Circle theorems

Angle at the centre 3

Angle at circumference (centre given)
Angle at the centre (circumference given)
MIXTURE - circle theorems (1)

Semicircle, segment, cyclic 4

Angle in a semicircle
Angles in the same segment
Cyclic quadrilateral
MIXTURE - circle theorems (2)

Tangents 3

Tangent–radius
Alternate segment theorem
MIXTURE - circle theorems (3)

Mixture 1

Circle theorems mixture

Constructions and loci

Constructions 4

Perpendicular bisector
Angle bisector
Perpendicular from a point to a line
Triangle SSS

Loci 4

Locus — fixed distance from a point
Locus — equidistant from two points
Locus — equidistant from two lines
Combined locus (region)

04 SECONDARY Statistics

33 topics
244 structures

Averages

Averages from a list (10)

- Calculate the range
- Calculate the mean - from a list
- Mean given - find a missing value
- Calculate the median
- Calculate the range and median
- Calculate the mean,median or range
- Find the mode
- Find the mode,mean or median
- Find the min/max - range given
- MIXTURE - averages (1)

Averages from a table (5)

- Calculate the mean
- Calculate the median
- Calculate the range
- Estimate the mean
- MIXTURE - averages (2)

Collecting Data

Collecting data – tally charts and frequency tables (4)

- Complete a tally table
- Draw and complete a tally table
- Discrete Data - tally and frequency
- Grouped Data - tally and frequency

Collecting data – Capture/Recapture (5)

- Capture-recapture - estimating the population
- Capture-recapture - calculating the sample size
- Capture-recapture - calculating the number marked
- Capture - recapture - mixture
- MIXTURE - Capture-recapture

Stratified sampling (2)

- Stratified sample size
- MIXTURE

Representing Data

Pictograms (3)

- Interpret pictograms
- Complete pictograms
- Draw pictograms

Bar charts (4)

- Bar charts - reading
- Bar charts - drawing - grid with axes
- Bar charts - drawing - grid
- Bar charts - drawing

Bar charts · Dual Bar charts (4)

- Dual Bar charts - reading
- Dual Bar charts - drawing - grid with axes
- Dual Bar charts - drawing - grid
- Dual Bar charts - drawing

Line Graphs (5)

- Line Graphs - reading
- Line Graphs - drawing - grid with axes

Line Graphs *continued*

- Line graphs - drawing - grid
- Line graphs - drawing
- Line graphs - (reading 2 lines)

Line Graphs · Distance – time (1)

- Distance time - questions

Pie Charts (9)

- Pie Charts - drawing
- Pie Charts - drawing - multiples of 10%
- Pie Charts - reading
- Pie Charts - reading
- Pie Charts - reading
- Pie Charts - reading
- Pie Charts - reading
- Pie Charts - reading
- Pie Charts - calculating angles

Cumulative Frequency (5)

- Plot a cumulative frequency graph
- Plotting and extracting information
- Reading quartiles
- Reading other information
- Reading other information (%)

Box and whisker plots (4)

- Plotting - extract info from cumulative frequency
- Draw the box plot
- Draw a box plot from a list
- Read a box plot

Tables · Reading information from tables (5)

- Reading tables
- Reading tables - footballers
- Reading a temperature table
- Timetables
- Using a calendar

Tables · Two-way tables (5)

- 2 way tables - reading
- 2 way tables - completing
- 2 way tables - completing
- 2 way tables - completing mixture
- MIXTURE - completing and reading

Histograms (9)

- Calculate frequency density
- Frequency from density and width
- Read frequency from a histogram
- Draw a histogram
- Draw a histogram from a table
- Find the total from a histogram
- Frequency in a range (scale omitted)
- Frequency in a range (total given)
- Estimate from a histogram

Frequency polygons (2)

- Midpoints for a frequency polygon
- Modal class from a frequency polygon table

Stem and leaf 3

Median from a stem-and-leaf diagram
Range from a stem-and-leaf diagram
Draw an ordered stem-and-leaf diagram

Probability

Basic Probability · Equally likely outcomes 12

Spinners P(shaded)
Spinner P(unshaded)
Words P(vowel)
n sided dice P(n/multiples)
n sided dice P(n/multiples/squares/primes)
Numbered counters P(odd/even/multiples/primes)
Picking counters - P(single colour)
Picking counters - P(single colour)
Picking counters - P(colour A or B)
Picking counters - P(colour A or B)
Sports choices - P(A or B)
MIXTURE - Probability

Basic Probability · Probabilities that add to 1 and 'not' happening - fractions 12

Vowels in words P(not a vowel)
n sided dice P(not an even number)
n sided dice P(not a square number)
Picking counters -P(not A)
Picking counters — P(not A or B)
Sports choices
Biased coin
Biased game
Sandwich choices
Spinner
Sports game
MIXTURE - basic probability

Basic Probability · Probabilities that add to 1 and 'not' happening - decimals 6

Biased coin
Biased game
Sandwich choices
Spinner
Sports game
MIXTURE - not happening

Product rule and listing Outcomes · Listing Outcomes 11

Drinks machine
Drinks machine — different drinks
Pizza — 2 toppings
Pizza — 3 toppings
2-letter codes (repeat allowed)
2-letter codes (no repeat)
3-letter codes (no repeat)
Sports matches (3)
Sports matches (4)
Sports matches (5)
MIXTURE - listing

Product rule and listing Outcomes · Product rule 21

Shirts and Trousers
Pizza base and toppigs
Meal deal
Spinner and dice
2-letter codes (with repeats)
2-letter codes (no repeats)
3-letter codes (with repeats)
3-letter codes (no repeats)
Password (3 independent choices)

Product rule and listing Outcomes · Product rule *continued*

Bike lock
Dials — multiples of 5
Dials — multiples of 10
Dials — even number
Dials — less than n
Dials — greater than n
Dials (no repeat) — multiples of 5
Dials (no repeat) — multiples of 10
Dials (no repeat) — even number
Dials (no repeat) — less than n
Dials (no repeat) — greater than n
MIXTURE - product rule

Frequency and Tree Diagrams - Combined Probability · Frequenmcy Diagrams - Independent Events - Decimals 7

Frequency tree — cars
Frequency tree — languages
Frequency tree — pets
Frequency tree — clubs
Frequency tree — books
Frequency tree — travel to work
MIXTURE - frequency tree

Frequency and Tree Diagrams - Combined Probability · Tree Diagrams - Independent Events - Decimals 9

Probability Trees (1) - compeleted diagram
Probability Trees (1) - blank diagram
Probability Trees (1) - no diagram
Probability Trees (2) - completed diagram
Probability Trees (2) - blank diagram
Probability Trees (2) - no diagram
Probability Trees (3) - completed diagram
Probability Trees (3) - blank diagram
Probability Trees (3) - no diagram

Tree Diagrams and Combined Probability · Independent Events - Fractions 15

Probability Trees (1) - compeleted diagram
Probability Trees (1) - blank diagram
Probability Trees (1) - no diagram
Probability Trees (2) - completed diagram
Probability Trees (2) - blank diagram
Probability Trees (2) - no diagram
Probability Trees (3) - completed diagram
Probability Trees (3) - blank diagram
Probability Trees (3) - no diagram
Probability Trees (4) - completed diagram
Probability Trees (4) - blank diagram
Probability Trees (4) - no diagram
Probability Trees (5) - completed diagram
Probability Trees (5) - blank diagram
Probability Trees (5) - no diagram

Tree Diagrams and Combined Probability · Dependent Events - Fractions 15

Sampling without replacemen - completed diagram
Sampling without replacement - blank diagram
Sampling without replacement - no diagram
Quiz team - completed diagram
Quiz team - blank diagram
Quiz team - no diagram
Socks in a drawer - completed diagram
Socks in a drawer - blank diagram
Socks in a drawer - no diagram
School bus - completed diagram
School bus - blank diagram
School bus - no diagram

Tree Diagrams and Combined Probability · Dependent Events – Fractions *continued*

- Late for work - completed diagram
- Late for work - blank diagram
- Late for work - no diagram

Sample Space diagrams · With tables drawn 12

- Two 4-sided dice - sum
- Two 4-sided dice - difference
- Two 4-sided dice - product
- Two 6-sided dice - sum
- Two 6-sided dice - difference
- Two 6-sided dice - product
- 6 and 4-sided dice- sum
- 6 and 4-sided dice - product
- 6 and 4-sided dice - difference
- Coin and spinner — double / half score
- Coin and die — multiply by n or m
- MIXTURE - sample spaces (1)

Sample Space diagrams · No tables 12

- Two 4-sided dice - sum
- Two 4-sided dice - difference
- Two 4-sided dice - product
- Two 6-sided dice - sum
- Two 6-sided dice - product
- Two 6-sided dice - difference
- 6 and 4-sided dice - sum
- 6 and 4-sided dice - product
- 6 and 4-sided dice - difference
- Coin and spinner
- Coin and die
- MIXTURE - sample spaces (2)

Expectation and Relative frequency · Expected outcomes 5

- Biased dice
- Seeds
- Sweet flavours
- Test questions
- MIXTURE - expected outcomes

Expectation and Relative frequency · Expected outcomes 7

- Coin — relative frequency
- Coin — relative frequency and expected outcomes
- Bus late — relative frequency
- Bus late — relative frequency and expected outcome
- Spinner — relative frequency
- Spinner — relative frequency and expected outcomes
- MIXTURE - relative frequency

Venn diagrams and set notation · Set Notation 7

- Union of 2 sets
- Intersection of 2 sets
- Factor and multiples
- Union and intersection from inequalities
- Three sets of multiples
- Operations on three listed sets
- MIXTURE - venn diagrams (1)

Venn diagrams and set notation · Venn diagrams 8

- P(neither) from worded data
- P(A ∪ B) from a Venn diagram
- Conditional probability from a Venn
- P(French only) from a Venn
- Shaded region in set notation
- Three-set shaded region
- Unknown region in a two-set Venn
- MIXTURE - venn diagrams (2)