Number: B^{i}DMAS

(1) (a) Work out $12 - 6 \div 3$ (or b) $15 + 3 \times 2$

(2) (a) Work out $17 - (7 + 6)$ (or b) $18 \div (7 + 2)$

Number: calculator skills

(1) Use your calculator to work out 5.1×3.4 or $\dfrac{17.34}{5.1}$ or $17.34 \div 5.1$

(2) Use your calculator to work out 5.1^2 or 5.1^3

(3) Use your calculator to work out $\sqrt{26.01}$ or $\sqrt[3]{132.651}$

(4) {mix of skills from (1), (2) and (3) e.g. $\dfrac{5.67 + 1.09}{9.2 - 7.65}$ or $10.4^2 + \sqrt{460}$}

(5) {same as (4) but (b) Give your answer correct to 1 decimal place}

(6) {same as (4) or (5) BUT control the end of root or index$^{\geq 4}$ }

(7) {same as (6) BUT give answer correct to 1 or 2 or 3 significant figures}

(8) {with sin or cos or tan e.g. $\sqrt{15^2 - 9.2^2} + 15 \tan 36°$}

Number: correct to

(1) Write 1823.56734 correct to the nearest whole number.

(2) Write 1823.56734 correct to 1 decimal place.

(3) Write £1823.56734 correct to the nearest pence.

(4) Write 1823.56734 correct to 2 decimal places.

(5) Write 1823.56734 correct to 3 decimal places.

(6) Write 1 823 476 correct to the nearest 10

(7) Write 1 823 476 correct to the nearest 100

(8) Write 1 823 476 correct to the nearest 1000

(9) Write 3.56734 correct to 1 significant figure. {$1 < n < 10$ and $n > 20$}

(10) Write 13.56734 correct to 1 significant figure. {$10 < n < 20$}

(11) Write 0.00734 correct to 1 significant figure. {n < 1)}

(12) Write 1823.56734 correct to 2 {or 3} significant figures.

(13) Write 0.0073456 correct to 2 {or 3} significant figures. {n < 1)}

(14) Write 429.526 correct to nearest integer. {rounding crosses e.g. the 10s boundary}

Number: estimate and accuracy

(1) {Estimates are all U × U BUT all "chop" never round up e.g. 6.1 × 8.3}

(2) The width, W m, of a lawn is measured as 17 m correct to the nearest metre.

Complete the range of possible values of W .... $\leqslant$ W < ....

(3) {Estimates are all U × U WITH a mix of "chop" and round up e.g. 6.5 × 3.7}

More available

(4) {Estimates are all U or TU × TU or HTU }

(5) {Word problem estimate are all U or TU × TU or HTU}

(6) John rounds a number, x, to one decimal place.

The result is 5.7 {U.t or TU.t or HTU.t NB t, the tenth is never 0}

Write down the error interval for x.

(7) {(a) Word problem estimate are all U or TU × TU or HTU}

(b) Is your answer to (a) an underestimate or an overestimate?

Give a reason for your answer.

Number: factors and primes

(1) Write 700 as a product of its prime factors {only ÷2 or ÷10 required}

(2) Write 216 as a product of its prime factors {also ÷9 and split into 3 × 3 required}

(3) Write down all the factors of 20

(4) Write 330 as a product of its prime factors {also ÷3 and ÷5}

(5) Find the highest common factor (HCF) of 60 and 75 {using (1), (2) and (4) skills}

(6) Find the lowest common multiple (LCM) of 16 and 40 {using (1), (2) and (4) skills}

(7) Given that

$$E = 2^3 \times 3^5 \times 5 \quad \text{and} \quad F = 2^4 \times 3 \times 5^2$$

write down, as a product of powers of its prime factors,

(i) the highest common factor (HCF) of E and F

(ii) the lowest common multiple (LCM) of E and F.

(8) Find the lowest common multiple (LCM) of 5, 6 and 9

(9) {Word problem - solve LCM }

(10) {Word problem - solve LCM - harder }

(11) Write 195 as a product of its prime factors {also reasoning about which primes to try}

(12) {Word problem - 2 possible numbers - given HCF and LCM }

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Number: FDPR as CALC (fraction, decimal, percentage, ratio)

(1) Shade in 64% of the square below.

Key

1   0.1   0.01
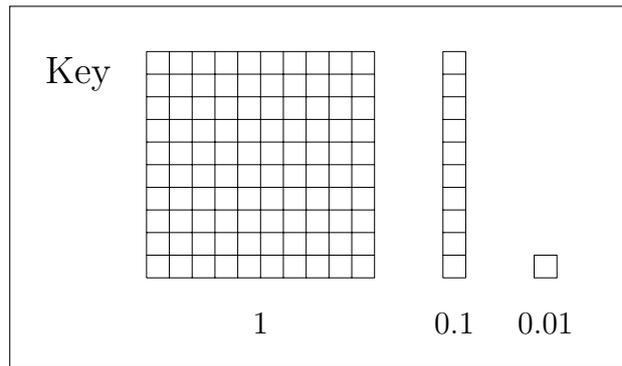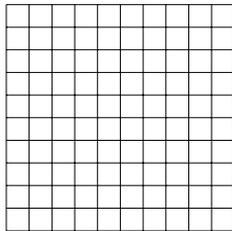
Write 64% as a decimal (You may use a calculator or the Key if this helps you)

(2) Write $\dfrac{11}{16}$ {or $\dfrac{21}{16}$} as a decimal.

(3) {Shade in 100 square(s) given F, D or P, convert to different F, D and P}

(4) Write 0.06 {or 0.46, 0.6, 2, 8.3407} as a percentage.

(5) Write $\dfrac{11}{16}$ {or $\dfrac{21}{16}$} as a percentage.

(No harder work yet)

Number: FDPR as NC (fraction, decimal, percentage, ratio)

(1) Part of this 100 square is shaded.
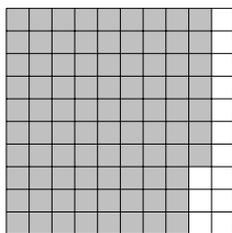
Write down the

   (i) fraction shaded   . . . .

   (ii) percentage shaded   . . . . %

(2) Write 53% as a fraction or write $\dfrac{19}{100}$ as a percentage.

(3) A probability is shown on this probability line with a cross.
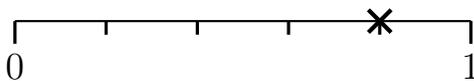
0   1   Write down the probability shown as a fraction.

(4) Write 142% or 42% or 3% or 0.4% or 0.27% as a decimal.

(5) Write 0.08 as a percentage. {includes removing leading 0's when necessary}

(6) The ratio of the number of premium seats to the number of standard seats is 1 : 4

   What fraction of the seats are premium seats?

(7) The fraction of boys in a class is $\dfrac{3}{5}$

   Write down the ratio of the number of boys to the number of girls in the class.

(8) Write 0.9 as a percentage. {includes adding trailing 0's when necessary}

(9) Write 40% as a decimal {includes removing trailing 0's when necessary}

(continued)

Number: FDPR as NC continued (fraction, decimal, percentage, ratio)

(10) {Word intro} Express 12 as a fraction of 72.

Give your answer in its simplest form.

(11) {Word intro} Write down the ratio of the number of A to the number of B.

Give your answer in its simplest form. {e.g. A = 90, B = 36}

(12) {Word intro} Write down 450 grams as a percentage of 1 kilogram.

(13) Write $\dfrac{9}{20}$ as a percentage. {fractions can be $\dfrac{\square}{4}$ or $\dfrac{\square}{5}$ or $\dfrac{\square}{10}$ or $\dfrac{\square}{20}$ or $\dfrac{\square}{25}$}

(14) Which is larger 78 % or $\dfrac{4}{5}$?

(15) Write $\dfrac{9}{20}$ as a decimal. {fractions can be $\dfrac{\square}{4}$ or $\dfrac{\square}{5}$ or $\dfrac{\square}{10}$ or $\dfrac{\square}{20}$ or $\dfrac{\square}{25}$}

Number: fraction +/-/×/÷

(1) Work out $\dfrac{5}{7} + \dfrac{1}{7}$ {or $\dfrac{5}{7} - \dfrac{1}{7}$}

(2) Work out $\dfrac{2}{3}$ x $\dfrac{2}{5}$

(3) Work out $\dfrac{1}{3} + \dfrac{2}{9}$ {one denominator is a multiple of the other}

(4) Work out $\dfrac{5}{6} - \dfrac{1}{3}$ {one denominator is a multiple of the other}

(5) Work out $\dfrac{2}{5} \div \dfrac{3}{7}$

(6) Work out $\dfrac{1}{2} + \dfrac{1}{6}$ {or $\dfrac{1}{2} - \dfrac{1}{6}$} {one denominator is a multiple of the other}

Give your answer in its simplest form.

(7) Work out $\dfrac{7}{8} \times \dfrac{4}{5}$

Give your answer in its simplest form.

(8) Work out $\dfrac{2}{5} \div \dfrac{6}{11}$

Give your answer in its simplest form.

(9) Work out $\dfrac{5}{7} - \dfrac{2}{5}$

(10) Work out $3\dfrac{7}{10} - 1\dfrac{2}{5}$

(11) Work out $\dfrac{3}{20} + \dfrac{7}{30}$

Give your answer in its simplest form.

(12) Work out $1\dfrac{7}{20} + 2\dfrac{4}{5}$

(13) Work out $3\dfrac{1}{3} \times 2\dfrac{3}{5}$

Number: negative number

(1) Write down the number shown on this number line
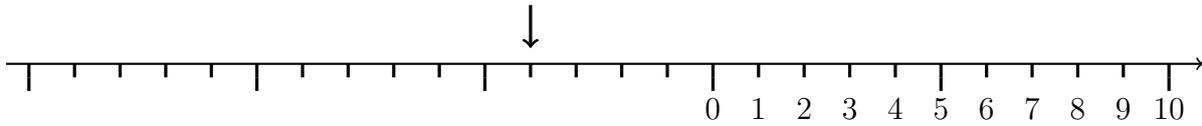
(2) Write the following numbers in order.

-1,   -3,   8,   -2,   1,   5,   -11

(3) Work out   9 - 12

(4) Work out   - 5 + - 6

(5) Work out   -12 + 9 or   -3 + 9

(6) Work out -2×3 or 4×-2

(7) Work out -5×-4

(8) Work out $28 \div -4$

(9) Work out $-28 \div 4$ or $-28 \div -4$

(10) Work out   15 - - 4

(11) Work out   - 3 - - 4 or   - 7 - - 4

Number: percent NC

(1) Work out 50% of £840 {ONLY even digits}

(2) Work out 50% of £78 {includes odd digits}

(3) Work out 10% of £54 200

(4) Work out 5% of £35 {or 1% or 20% or 25%}

(5) Work out 30% of £4200{or 15% or 75%}

(6) Work out 40% of £520{or 2% or 80% or 2.5%}

(7) {Word problem e.g. calculate 20% of 240}

(8) {% increase or decrease word problems e.g. How much will her new salary be? }

Number: place value: decimal

(1) Write down the value of the 3 {or 4} in the number 12.34567

(2) Write these numbers in order of size. {Start with the smallest/largest/not told}

   (a) 0.6   0.0006   6   0.006   0.06   (b) 0.61   0.49   0.58   0.47   0.67   0.21

(3) Use the information that $3 \times 7 = 21$ to find the value of 0.3×7

(4) Work out 2×0.6

(5) Work out 2×0.06

(6) Work out 0.2×0.6

(7) Use the information that $452 \times 57 = 25764$

   to find the value of 45.2×57 or 452×0.57

(continued)

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Number: place value: decimal (continued)

(8) Write these numbers in order of size.   0.56   0.65   0.6   0.5   0.06

(9) Write these numbers in order of size.   0.5   0.6   0.56   0.666   0.506   0.05

(10) Work out the value of $\dfrac{3.6}{0.9}$

(11) Work out the value of $\dfrac{27}{0.9}$ or $\dfrac{270}{0.9}$ or $\dfrac{2700}{0.9}$

(12) Work out the value of $\dfrac{44}{0.5}$

(13) Work out the value of $\dfrac{5.6}{8}$ or $\dfrac{0.56}{8}$ or $\dfrac{5.6}{80}$ or $\dfrac{0.056}{8}$

(14) Use the information that $51.3 \times 48 = 2462.4$

    to write down the value of 5130×4800 or $0.24624 \div 0.48$

Number: place value: integer

(1) {Order a set of two digit numbers.}

(2) Write down the value of the digit 2 {or 3 or 4} in the number 12 345

(3) {Order a set of {two and} three digit numbers.}

(4) Use the information that $8 \times 3 = 24$ to find the value of 8×30

(5) Work out 5×90 {Excludes any where simplest product ends with 0 e.g. 5×60 etc}

(6) Work out 400×6 {Excludes any where simplest product ends with 0 e.g. 500×6 etc}

(7) Work out 40×20 {Excludes any where simplest product ends with 0 e.g. 50×60 etc}

(No harder work yet)

Number: standard form

(1) Write 7.306×10^2 as an ordinary number

(2) Write 3.9×10^{-3} as an ordinary number

(3) Write 56.3 in standard form

(4) Write 0.000 052 38 in standard form

(5) Write these numbers in order of size. {Start with the smallest/largest/not told}

    340×10^1 3.4 34×10^{-4} 0.0034×10^2

(6) Write 410×10^4 or 410×10^{-4} in standard form

(7) Calculate $7 \times 10^2 \times 3 \times 10^4$

    Give your answer in standard form.

(8) Work out $(3.6 \times 10^{-4}) \times (5.3 \times 10^2)$

    Give your answer in standard form.

(9) Work out $(4.6 \times 10^5) \div (9.2 \times 10^1)$

Number: value index

(1) Ffion says that the value of 9^2 is 18

Is Ffion right?

You must give a reason for your answer.

(2) Here are four possible ways to write 4^3

(i) $4 \times 4 \times 4$ (ii) $3 \times 3 \times 3 \times 3$ (iii) $4 + 4 + 4 + 4$ (iv) $3 + 3 + 3$

Circle the correct one.

(3) Write down the value of 6^2 {7^2 or 8^2} or 2^3 {3^3, 4^3, 5^3, 10^3, 10^4 or 10^5}

or 2^4 {2^5, 2^6, 2^7, or 1^2, 1^3, 1^4 or 1^5}

(4) Write down the value of $\left(\dfrac{3}{8}\right)^1$ {$\left(\dfrac{3}{8}\right)^0$, 5^1 or 5^0}

(5) Write down the value of 16^{-1} OR Write down the reciprocal of 3

(6) Evaluate 6^{-2} OR Write down the value of 4^{-3}

(7) Write down the value of $64^{\frac{1}{2}}$

(8) Write down the value of $\left(\dfrac{4}{9}\right)^{-1}$ OR Write down the reciprocal of $\dfrac{25}{9}$

(9) Evaluate $\left(\dfrac{36}{49}\right)^{\frac{1}{2}}$

(10) Write down the value of $\left(\dfrac{4}{9}\right)^{-2}$

(11) $2^p = 32$

Write down the value of p

(12) $2^7 \div 2^q = 2^4$ or $2^4 \times 2^q = 2^9$

Work out the value of q

(13) Evaluate $\left(\dfrac{125}{64}\right)^{\frac{1}{3}}$

(14) Find the value of $\left(\dfrac{100}{9}\right)^{-\frac{3}{2}}$

Word Problem and Proportion: add NC

(1) {single digit + single digit word problem}

(2) {single digit + double digit (not teen), no carry, word problem}

(3) {single digit + teen digit, no carry, word problem}

(4) {single digit + double digit, no carry, word problem}

(5) {single digit + teen/double digit, units carry, word problem}

(6) {teen/double digit + teen/double digit, units carry, word problem}

(7) {teen/double digit + teen/double digit, tens carry, word problem}

(8) {teen/double digit + teen/double digit, tens and units carry, word problem}

Word Problem and Proportion: best value

(1) Kaja wants to buy 4 fish cakes.

A shop sells the same type of fish cakes in two different size packets.

2 fish cakes for £1.25

4 fish cakes for £2.19

Which size packet is best value for money?

You must show all your working.

{or buy 1 (or 2) get one free, or family ticket v separate adult and child ticket}

(2) {also need to convert between kg and grams or litres and ml}

(3) {compare 3 shops with different deals or buy multiples of 2 two different items}

(4) {Similar to (1) but we are NOT told how much the person wishes to buy}

(No harder work yet)

Word Problem and Proportion: divide NC

(1) {word problem ? ÷ 2, 9 or 10 = U}

(2) {word problem ? ÷ 3, 4, 5, 6, 7 or 8 = U}

(3) {word problem ? ÷ U = teen e.g. 11 or 13 etc.}

(4) {word problem ? ÷ U = TU}

(5) {word problem ? ÷TU = TU}

(6) {word problem ? ÷ U = U and a bit. Must give sensible answer from context}

(7) {word problem ? ÷ TU = TU or U and a bit. Must give sensible answer from context}

Word Problem and Proportion: exchange rate

The exchange rate is £1 = 1.216 euros.

(1) {Word problem change from pounds to euros}

(2) {Word problem change from euros to pounds}

(No harder work yet)

Word Problem and Proportion: FDPR of CALC (fraction, decimal, percentage, ratio)

(1) Work out 68% {or 328%} of 90

(2) Work out $\frac{1}{6}$ {or $\frac{5}{6}$} of 186

(3) {word problem - work out percentage of required}

(4) {word problem - work out fraction of required}

(No harder work yet)

Word Problem and Proportion: fraction of (NC)

(1) Write down the fraction of the shape that is shaded.
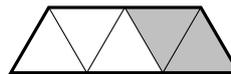
(2) Work out $\dfrac{1}{9}$ of 54 {ONLY unit fraction}

(3) Work out $\dfrac{7}{9}$ of 36 {NEVER unit fraction}

(4) {word problem ONLY unit fraction} e.g. $\dfrac{1}{8}$ of 240

(5) {word problem NEVER unit fraction} e.g. $\dfrac{3}{8}$ of 240

(6) {fraction of word problem e.g. $\dfrac{2}{5}$ of 45 were rainy} How many days were **not** rainy.

(No harder work yet)

Word Problem and Proportion: how much enough CALC

(1) {word problem requires add of a few values (money, length or weight) }

(2) {word problem requires multiply a value (money, length or weight) by a frequency}

(3) {word problem requires multiply and add (money, length or weight)

frequencyM × valueM + frequencyN × valueN OR

frequency(valueM + valueN) or frequency × valueM + frequency × valueN OR

frequency × value + fixed value}

(4) {word problem like (1), (2) or (3) but require a change of unit}

(5) {word problem need to know and use there are 365/6 days in year}

(6) {word problem need to multiply and multiply again}

Word Problem and Proportion: how much enough NC

(1) {simple money word problem: pence + pence OR pounds + pounds}

(2) {add 2 or 3 or 4 values (money, length or weight) and say whether enough}

(3) {given amount paid and cost of item, find change received.

or given amount paid and change received, find cost of item.}

(4) {buys some items (given prices) and amount tendered must find change}

(5) {buys some items (given prices) and one other item (must find this price)

given amount tendered and change}

(6) {single digit × double digit in context of money, length or weight and use in problem
e.g. find change, say whether enough, or how much left over}

(7) {double digit × double digit in context of money, length or weight and use in problem
e.g. find change, say whether enough, or how much left over}

(8) {buys some items (given prices) and multiple item (must find this price)

(9) {change metric units and multiply as hard as TU× HTU}

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Word Problem and Proportion: ingredients

Given list of ingredients for 4 people {or 20 biscuits etc}

(1) Write out a list of ingredients for 8 people {only ×2}}

(2) {write out ingredients/just one ingredient for 12 people (×3 or ×4 or ×10)}

(3) {write out ingredients/just one ingredient for for 2 people (×0.5 or ×1.5 or ×2.5)}

(No harder work yet)

Word Problem and Proportion: multiply NC

(1) {word problem 2, 9 or 10 × U}

(2) {word problem 4 or 5 × U (not covered in 1) }

(3) {word problem 3, 6, 7 or 8 × U (not covered in 1 or 2) }

(4) {word problem U × teen }

(5) {word problem U × TU}

(6) {word problem TU × TU}

(7) {word problem TU ×£U.t0 }

(8) {word problem TU ×£U.th }

(9) {word problem TU × HTU in context other than money}

(10) {word problem compare U × TU with another U × TU explain meaning in context}

Word Problem and Proportion: ratio

Faith and Katy share £35 in the ratio 5 : 2

(1) Work out how much each person gets

(2) Work out how much more Faith gets than Katy}

(3) {Similar to (1) but share into three parts}

(4) Emelie and Fern share some money in the ratio 3 : 5

Fern gets £800 {Questions set to mislead as 800÷8 is wrong but encouraged by numbers}

Work out how much Emelie should have.

(No harder work yet)

Word Problem and Proportion: subtract NC

(1) {word problem U - U}

(2) {word problem TU - U or TU - TU, NO carry}

(3) {word problem TU - teen, NO carry}

(4) {word problem TU - TU, WITH carry}

(5) {word problem TU - U, WITH carry}

(6) {word problem TU - teen, WITH carry}

(7) {word problem mix of multiple adds and multiple subtracts, some with carry}

Word Problem and Proportion: types of number

Here is a list of numbers.

| 2 | 4 | 8 | 10 | 14 | 16 | 18 | 20 | 40 | 81 |

(1) From this list, write down a multiple of 6. {or even number or odd number}

(2) From the numbers in the list, write down a factor of 28.

(3) From this list, write down a cube number. {or square number}

(4) From this list, write down a prime number.

(5) {Word problem: find the 3 square/cube numbers / multiples /factors of given clues}

Algebra: algebra graph

(1) Complete the table of values for x = 3 {OR y = 4, or y = 3x + 2 or y = 5 - x}

x			3	3	3		
y	-2	-1	0	1	2	3	4

Plot on graph.

(2) {y = mx + c form, x values given and 1 y value as check, table on calculator encouraged}

(3) {y = mx + c form, no incomplete table given, table on calculator encouraged}

(4) {y = 3, x = 2, x + y = 5, etc and y = x, y = -x no incomplete table given}

Algebra: expand

(1) Expand $5(y + 2)$ or $5(y - 2)$

(2) Expand $y(y + 2)$ or $y(y - 2)$

(3) Expand and simplify $(x + 5)(x + 3)$ or $(x + 5)(x - 3)$ {NOT $(x - 5)(x - 3)$}

(4) Expand and simplify $(x - 5)(x - 3)$

(5) Expand and simplify $(q - 2)(q + 2)$ {difference of 2 squares}

(6) Expand $3(4x - 1)$

(7) Expand $5(2 - k)$ or $5(1 + 3k)$

(8) Expand and simplify $3(4x + 1) + 4(2x - 1)$

(9) Expand and simplify $3(4x + 1) + (2x - 1)$

(10) Expand $a(5a + 3)$

(11) Expand $5k(2 - k)$ or $5k(1 + 3k)$

(12) Expand and simplify $(2q + 3)(3q - 5)$

(13) Expand $3(2y - x)$

(14) Expand and simplify $(5m + n)(2m - n)$

(15) Expand $-3(2m - n)$ or $-(2m - n)$

(16) Expand and simplify $5(2a + 3) - 3(4a - 2)$ or $5(2a + 3) - (4a - 2)$

Algebra: factorise

(1) Factorise $3p - 12$ or $12 - 3p$

(2) Factorise $2y^2 - 6y$ or $6y - y^2$

(3) Fully factorise $12x^2 - 6xy$

(4) Factorise $p^2 - 16$

(5) Factorise $y^2 - 8y + 15$ {Factorise the form $y^2 \pm \square y + \square$}

(6) Factorise $y^2 - 2y - 15$ {Factorise the form $y^2 \pm \square y - \square$}

Algebra: inequality, equality and expression

(1) Here is an inequality, in m, shown on a number line.

m is an integer.
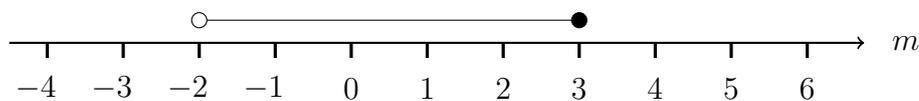
List all the possible values of m.

(2) y is an integer such that $-3 \leqslant y \leqslant 0$

List all the possible values of y.

(3) {Write down an inequality e.g. (1) or $x > -2$ or show $x > -2$ on number line.}

(No harder work yet)

Algebra: number machine

input $\longrightarrow$ | 1 stage | $\longrightarrow$ output OR input $\longrightarrow$ | 1st stage | $\longrightarrow$ | 2nd stage | $\longrightarrow$ output

(1) {1 stage} Work out the **output** when the input is ... {+, - , × U or ÷ by 2 or 9 or 10}

(2) {2 stage} Work out the **output** when the input is ... {+, -, × or ÷ U}

(3) {1 stage} Work out the **input** when the output is ... {+, -, × or ÷ U}

(4) {2 stage} Work out the **input** when the output is ... {+, -, × or ÷ U}

(5) {Word problem e.g to convert gas mark 5 into °F}

| Temperature °F | = | Gas mark × 25 | + | 250 |

Algebra: sequence: arithmetic

(1) Here is a number sequence   4   8   12   16   20   24   28

(i) All the numbers in the sequence are .... of .... {either multiples or 4 to fill in}

(ii) Write down the next term in the sequence

(2) Here are the first 5 terms of an arithmetic sequence.   5   9   13   17   21

(i) Write down the term to term rule of the sequence

(ii) Write down the next term of the sequence

(3) Here are the first five terms of an arithmetic sequence.   5   9   13   17   21

Find the 8th term of this sequence.

Here is part of a sequence of patterns made from sticks.

Pattern number 1   Pattern number 2   Pattern number 3
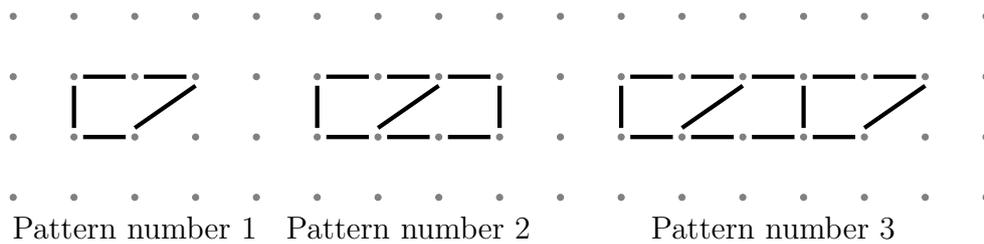
(4) (a) In the space, below draw {or complete} Pattern number 4

(b) Complete the table

Pattern number	1	2	3	4	5
Number of sticks	5	9	13		

(5) How many sticks are there in pattern number 7?

(6) Here are the first five terms in a sequence.   16   13   10   7   4

(a) Write down the 8th term of the sequence.

(b) Write down (ii) the term to term rule of the sequence (ii) the next term

(7) Here are the first five terms of an arithmetic sequence.   5   9   13   17   21

Is 43 a term of the sequence?

(8) Here are the first five terms of a sequence.   4   8   12   16   20

An expression for the nth term of this sequence is $4n$

Write down in terms of n, an expression for the nth term of   3   7   11   15   19

(9) The nth term of a number sequence is given by $3n+1$ {TABLE on calculator encouraged}

Work out the first **four** terms of the number sequence

Algebra: sequence: other

(1) The number of dots {or squares} in each pattern is a triangle number.
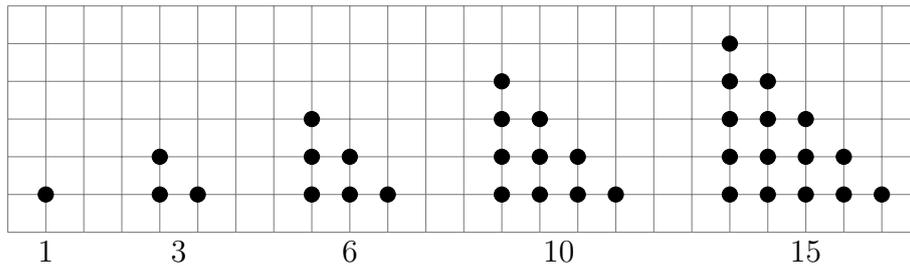
Write down {or draw} the next {or missing} triangle number OR

The rule to continue a triangle number sequence is add on one more each time.

Write down the next triangle number.

(2) Here are the first seven terms of a Fibonacci sequence.

$$1 \quad 1 \quad 2 \quad 3 \quad 5 \quad 8 \quad 13$$

The rule to continue a Fibonacci sequence is,

the next term in the sequence is the sum of the two previous terms.

Find the 10th term of this sequence.

(No harder work yet)

Algebra: simplify +/-

(1) Simplify $p + p + p + p$

(2) Simplify $5a + 2a$ or $9y - 5y$ or $x + x + 3x$ or $5f + f + f - f$

(3) Simplify $3x - 7x$ or $-2f - 5f$ or $-f + 4f$

(4) Simplify $-4p - q + 5p - q$

(5) Simplify $2y - 2 - 6y + 7$

(6) Simplify $7a + 2b - 3 - 3a - 7$

(7) Simplify $3a^2 - 5a^2$ or $-3xy - 5xy$

Algebra: simplify x/÷

(1) Simplify $x \times x \times x \times x \times x$

(2) Simplify $e^7 \times e^3$ OR $y^6 \times y$

(3) Simplify $n \times m$ OR $w \times w$

(4) Simplify $4 \times a \times d$ OR $a \times 4 \times d$ OR $a \times d \times 4$

(5) Simplify $4a \times 2$ OR $2 \times 4a$ OR $2 \times a \times 4$

(6) Simplify $a \times 4d$ OR $4a \times d$ OR $4a \times a$

(7) Simplify $2x \times 4y$ OR $3y \times 5x$ OR $3y \times 5y$

(8) Simplify $y^8 \div y^3$ OR $\dfrac{n^4}{n}$

(continued)

Algebra: simplify x/÷ continued

(9) Simplify $2a^5b \times 3ab^3$

(10) Simplify $\dfrac{14e^5 f^2}{7e^3 f}$

(11) Simplify $(a^3 f^2)^4$

(12) Simplify $(2y^3)^3$

Algebra: solve

(1) Solve $\dfrac{q}{3} = 12$ {one stage}

(2) Solve $\dfrac{w}{10} + 3 = 4$ {two stage, solution is integer between 1 and 15}

(3) Solve $\dfrac{w}{10} + 3 = 2$ {two stage, solution is 0, 1, negative or easy decimal such as 2.5}

(4) Solve $x + 19 = 3x + 7$ {x on both sides but no minus signs}

(5) Solve $7x + 4 = -1$ {two stage, solution is e.g. $\dfrac{-5}{7}$}

Algebra: value of: algebra

(1) Work out the value of P {Student may use diagram to help or see (3) }

$P = 10e$

$e = 7$

3e cm

2e cm

2e cm

3e cm
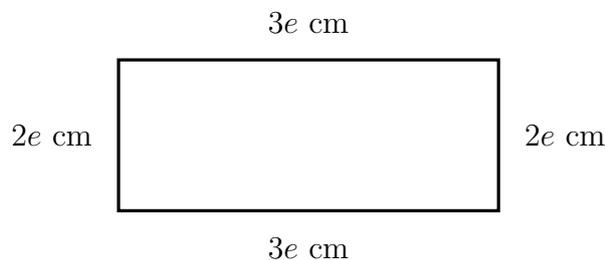
Diagram NOT accurately drawn

Perimeter $= 10e$ cm

(2) {Like (1) but two variables, student may use diagram to help or see (4)}

(3) $u = 4t$ {similar (1) but no context}

   $t = 9$

   Find the value of u

(4) $p = 3$ {similar (2) but no context}

   $q = 8$

   Work out the value of $7p + 2q$

(5) $p = 3$ {similar (4) but with negative (never negative $\times$ negative)}

   $q = 8$

   Work out the value of $7p - 2q$

(No harder work yet)

Algebra: write in algebra

(1) A multipack contains b packs of barbecue flavour crisps, and p packs of plain crisps.

Write down an expression for the total number of packs of crisps in the multipack.

(2) A hotel buys 7 packets of hand towels.

Each packet contains h hand towels.

They buy a total of T hand towels.

Write a formula for T, in terms of h.

(3) Joni has n packets of apples.

There are 6 apples in a packet.

(i) Write down an expression, in terms of n, for the total number of apples Joni has.

11 of Joni's apples are eaten.

 (ii) Write down an expression, in terms of n, for the number of apples Joni has now.

(4) A hotel buys some glasses.

They buy m packets of wine glasses.

They buy n packets of water glasses.

Each packet of wine glasses contains 4 glasses.

Each packet of water glasses contains 6 glasses.

They buy a total of T glasses.

Write a formula for T, in terms of m and n.

(5) Here are the first five terms of a Fibonacci sequence.   5   2   7   9   16

The rule to continue a Fibonacci sequence is,

the next term in the sequence is the sum of the two previous terms.

(i) Find the 7th {6th or 8th or 9th or 10th} term of the sequence.

The first four terms of a different Fibonacci sequence are j k $j+k$ $j+2k$

(ii) Show that the 7th {or 6th or 8th or 9th} term of this sequence is $3j + 5k$

Geometry and Measure: accurate diagram: interpret

(1) Measure the length of the line PQ.

P $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ Q {e.g. 5.6 cm}

(2) Measure the length of PQ {Line not horizontal, other lines in diagram}

(continued)

Geometry and Measure: accurate diagram: interpret continued

(3) Write down the bearing of Q from P.
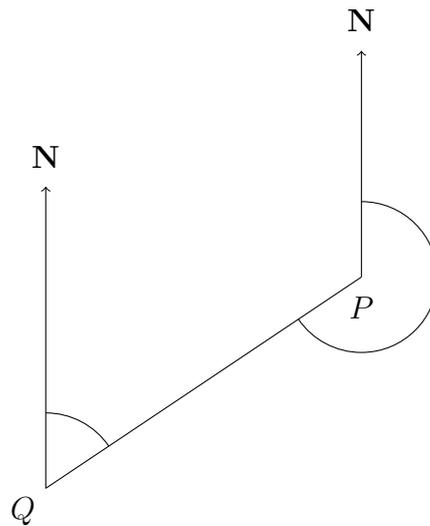
(4) The diagram {above} shows the position of two check points P and Q.

The scale of the diagram is 1 cm represents 10 km {or 1 km or 100km}

Write down the distance from P to Q.

(5) Measure an angle {measure from horizontal only}

(No harder work yet)

Geometry and Measure: angle: calculate

(1) {Solve problem using: angle ... point ... 360°}

(2) {Solve problem using: angle ... straight line ... 180°}

(3) {Solve problem using: angle ... triangle ... 180°}

(4) {Solve problem using: angle ... quadrilateral ... 360°}

(5) {Solve problem using: ABC for labelling angles and one rule from (1) to (4)}

(No harder work yet)

Geometry and Measure: area (found after shape properties)

Geometry and Measure: change units {some are word problems}

(1) Change 8.2 cm into mm.

(2) Change 8.2 m into cm.

(3) Change 3.127 kg into grams. {or litres to ml or km to metres: conversion $\times$ by 1000}

(4) Change 400 millilitres into litres {or grams to kg or m to km: conversion $\div$ by 1000}

(5) Change 250 millimetres into centimetres { etc. conversion $\div$ by 10, 100 or 1000}

(6) How many minutes are there in $1\frac{3}{4}$ hours?

(No harder work yet)

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Geometry and Measure: coordinates

    (1) {Plot coordinate in first quadrant}

    (2) {Write down coordinate of point found in the first quadrant}

    (3) {Plot/write down coordinate, diagram has only 1st and 2nd OR 1st and 4th quadrant}

    (4) {Plot coordinate in any quadrant}

    (5) {Write down coordinate of point in any quadrant}

    (6) {Plot coordinate to complete e.g. square, parallelogram}

    (7) {Plot/write down coordinate of point on the x or y axis}

Geometry and Measure: find A or V first (area or volume) found after shape properties

Geometry and Measure: perimeter found after shape properties

Geometry and Measure: shape names and properties

    (1) Write down the mathematical names of given polygon. {pent/ hex/ oct/ dec/ -agon}
        How many sides has a pentagon? {or hex/ oct/ dec/ -agon}

    (2) Write down the mathematical names of given solid.
        {triangular/pentagonal/hexagonal prism, cone, cube, cuboid, cylinder, sphere}
        {triangle/square/pentagon/hexagon based pyramid}

    (3) Find/draw/complete shape with one {or two} lines of symmetry.

    (4) Write down the order of rotational symmetry of a shape /mark centre of rotation/
        complete shape with rotational symmetry of order two {or 3 or 4} /
        complete shape with rotational symmetry of order two with no lines of symmetry.}

    (5) Write down the mathematical name of quadrilateral {or draw}
        {square, rectangle, kite, rhombus, parallelogram, trapezium}
        or special name of triangle{scalene, isosceles, equilateral and right}

    (6) Find congruent shapes

    (7) Write down name of kind of angle {acute, right, obtuse, reflex}

    (8) Write down the name of a solid {given net of triangular/pentagonal/hexagonal prism
      cone, cuboid, cube, cylinder, sphere, triangle/square/pentagon/hexagon based pyramid}

    (9) Mathematical name for part of a circle {circumference, centre, radius, diameter}

    (10) Shade the face of a solid ABCD or write down the number of faces, edges or vertices

Geometry and Measure: area and perimeter   NB the different order of difficulty


(a) (b) (c)

(d)

7 cm

10 cm

Diagram NOT accurately drawn

(e)
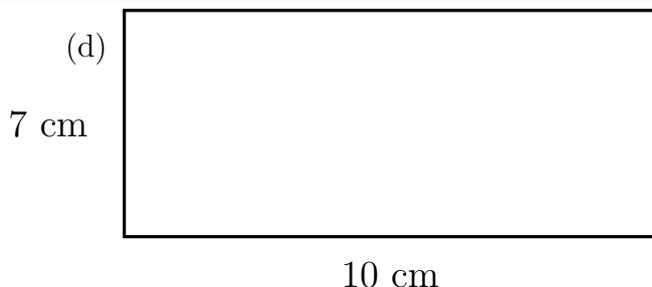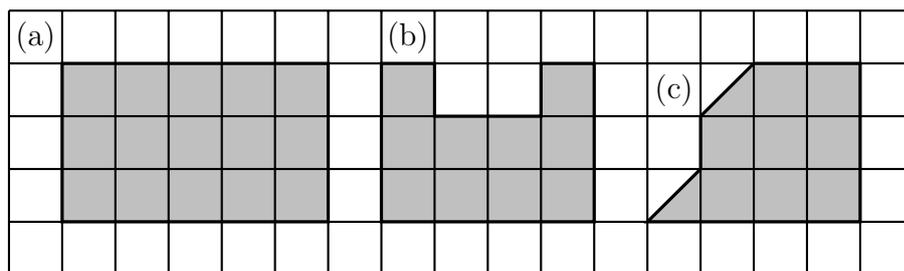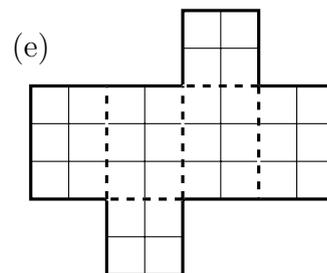
Geometry and Measure: area

(1) Find the area of the shaded rectangle (a) {or shape (b)}

(2) Find the area of the shaded shape (c) {N.B. countable 1/2 squares}

(3) Work out the area of the rectangle. (d) {NC}

(4) {Work out area of rectangle, width = 15.3cm height = 6cm - calculator encouraged}

(5) {Work out area of square, side length = 3.7km - calculator encouraged}

(6) {Work out area of circle, radius = 6.5 metres - calculator encouraged}

(7) {Work out area of parallelogram, width = 15.3 cm height = 6cm NC}

(8) {Work out area of right angled triangle, width = 9 cm height = 5cm NC}

(No harder work yet)

Geometry and Measure: find A or V first (area or volume)

(1) Above (e) is the net of a cuboid drawn on a grid of centimetre squares.

Work out the surface area of the cuboid.

(No harder work yet)

Geometry and Measure: perimeter

(1) Find the perimeter of the shaded rectangle. {see diagram (a)}

(2) Work out the perimeter of the rectangle. {see diagram (d)}

(3) Find the perimeter of the shaded shape. {see diagram (b)}

(4) {Work out perimeter of rectangle, width = 15.3 cm height = 6.2 cm}

(5) {Work out perimeter of square, side length = 3.7km}

(6) {Work out circumference of a circle, diameter = 28.2km, - calculator encouraged}

(No harder work yet)

Geometry and Measure: transform: shape

(1) Reflect the shaded shape in the mirror line. {mirror line touches shape}

(2) Reflect the shaded shape in the mirror line. {mirror line does NOT touch shape}

(3) Translate shape F four squares to the left. {translate in one direction 2/3/4/ left/right/up/down}

(4) Rotate trapezium F 90° clockwise {or anti-clockwise} about the star {touches shape}

(5) Reflect the shaded shape in the x-axis {or y-axes}

(6) Translate shape F four squares to the left and two squares up {or right or down}

(7) Draw an enlargement of a shape scale factor 2 {or 3, no sloping sides, or centre given}

(8) Rotate shape 90° {or 270°} {anti-}clockwise about a coordinate {touches shape}

Rotate shape 180° about a coordinate {touches shape}

(9) Reflect the shaded shape in a diagonal mirror line. {shape not on squares of grid}

(10) Draw an enlargement of a shape scale factor 2 {or 3, sloping sides, no centre given}

(No harder work yet)

Geometry and Measure: volume

(1) Find the volume of the solid shape. {made from centimetre cubes}

(a)   (b)   (c)
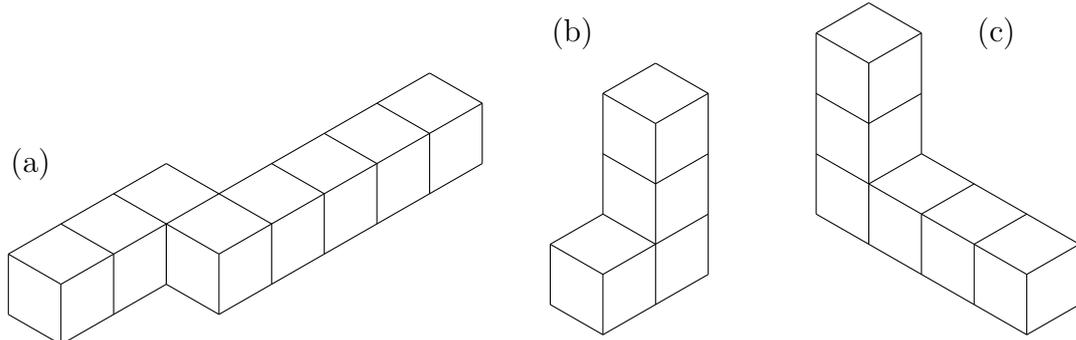
(2) Find the volume of the solid shape. {cuboid made from centimetre cubes NC}
{ one dimension = 1cm, other two dimensions are large so hard for student to count}

(3) Find the volume of the cuboid {e.g. 3×4×5, cubes shown NC}

(4) Find the volume of the cuboid {e.g. 3×4×5, NO cubes shown NC}

(5) Find the volume of the cuboid {e.g. 3.1×6.8×7.7, NO cubes shown, calculator allowed}

Probability and Statistics: continuous data graph

Using given conversion e.g. 1 gallon = 4.5 litres

(1) {Complete table, draw graph and convert from x-axis to y-axis}

(2) {Similar to (1) but convert from y-axis to x-axis}

(No harder work yet)

Probability and Statistics: different ways and simple probability

(1) There are 7 good rulers and 2 broken ruler in a tray.

A ruler is taken at random from the tray.

What is the probability that the ruler is broken?

(2) There are only blue counters, green counters and white counters in a bag.

There are 3 blue counters.

There are 5 green counters.

There is 1 white counter.

Arianna takes a counter, at random, from the bag.

Work out the probability that she takes a counter that is **not** green.

OR

The probability of picking a broken pen from a pot is 0.15

Work out the probability that a pen, picked at random, from the pot

will **not** be broken.

(3) India puts these tiles in a bag. ○ ■ □ ■ △ ▲ △ ▲
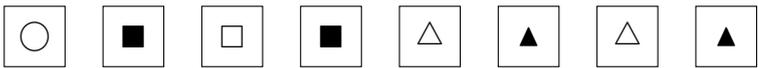
India, shakes the bag and takes a tile, at random, from the bag.

(i) Choose the word that best describes the probability that ....

impossible   unlikely   evens   likely   certain

(ii) On the probability scale below, mark with a cross (×) the probability that

$$0 \qquad \tfrac{1}{2} \qquad 1$$
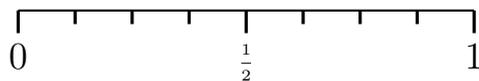
... India takes a white shape.{possible to list all outcomes}

(4) India puts these tiles in a bag. ○ ■ □ ■ △ ▲ △ ▲

India, shakes the bag and takes a tile, at random, from the bag.

Which shape is she most likely to take? {tests the "mathematical" meaning of likely}

OR
Choose the word that best describes the probability that you will be
alive in 10 years time.{not possible to list all outcomes}

impossible   unlikely   evens   likely   certain

(continued)

Probability and Statistics: different ways and simple probability continued

(5) Barnaby is attending a summer camp.

One day every camper must choose a sport and a craft.

Sport	Craft
Danzercise	Drawing
Football	Mosaic
Running	Origami

Write down all the possible combinations

The first one has been done for you.

(6) {Word problem where given a selection of experiments with different number of trials

asks which is the best estimate of a probability

OR

asks student to use all the results to find a better estimate of probability}

(No harder work yet)

Probability and Statistics: discrete data graphs

(1) Write down the number of ... {frequency required on on frequency axis, is labelled}

Write down the number of ... {whole number of pictures in pictogram}

(2) Complete the bar chart {frequency required on on frequency axis, is labelled}

Complete the pictogram{whole number of pictures in pictogram}

(3) Complete the tally {or frequency} chart

complete a bar chart, {both axis already labelled}

or complete a pictogram, {table and key given}

(4) Write down the mode from bar chart or pie chart or pictogram or frequency table.

{data labels are things not numbers}

(5) Write down the number of ... {frequency required on on frequency axis, is NOT labelled}

Write down the number of ... {quarter, half or three quarters of picture in pictogram}

(6) Complete the bar chart {frequency required on on frequency axis, is NOT labelled}

Complete the pictogram{quarter, half or three quarters of picture in pictogram}

(7) Given frequency table, bar chart or pictogram e.g. coloured t-shirts sold
How many less/more colour A than colour B were sold ?
What colour was the t-shirt that more then/exactly/less than {frequency} were sold?
How many t-shirts were sold in {time frame}?
What fraction of the t-shirts sold were colour A ?

(8) Complete back to back pictogram, dual bar chart/frequency table.

Answer questions from back to back pictogram, dual bar chart/frequency table.

(9) Find errors in pictogram, bar chart, frequency table or pie chart.

Probability and Statistics: frequency or probability table

In a school's meal deal a drink is included.

This table gives some information about which drink 120 people chose.

	Fizzy	Juice	Water
Girls	18	39	11
Boys	22	7	4
Teachers	3	5	11

One of the people is chosen at random.

(1) Write down the probability that the person was a boy who chose juice.

(2) Write down the probability that the person was a boy.

The table shows the probability that a counter take at random from the bag will be yellow, blue, red, green or white.

Colour	yellow	blue	red	green	white
Probability	0.24	0.31	0.2	0.1	

(3) Work out the probability that the counter will be white. (4) too hard - described between (6) and (7)

(5) {Given 2 way entry table grid EITHER partially complete

OR blank plus word clues, complete the table (and sometimes state a probability)}

(6) {Complete frequency tree - easy gaps}

(4) {see Q3}There are 1200 counters in the bag.

Work out the number of red counters in the bag.

(7) {Complete frequency tree - hard gaps}

(8) {Word problem which is easy to solve by creating a two-way entry table}

Probability and Statistics: MMMRQ (mean, median, mode, range and quartiles)

(1) Write down the mode.

(2) Write down the range

(3) Write down the median {odd number of non ordered data items}

(4) Write down the mean

(5) Write down the median {even number of non ordered data items}

(6) Complete a table to show the minimum, lower quartile (LQ), median, UQ and maximum odd number of ordered data items}

(7) Complete a table to show the minimum, lower quartile (LQ), median, UQ and maximum odd number of UNordered data items}

Probability and Statistics: probability tree

(1) {Given partially completed tree diagram - student finds "quick way" to calculate p(branch)}

(2) {Given tree with probability on each branch - word problem to calculate p(branch)}

(No harder work yet)

Probability and Statistics: scatter

(1) {Add data values to scatter and state type of correlation}

(2) {Given x-value of extra data item estimate y-value from scatter graph}

(No harder work yet)

Probability and Statistics: stem and leaf

(1) {Complete a stem and leaf diagram, data is TU, grid and key given}

(2) {Given or complete a stem and leaf diagram, data is TU and key given, and ...
   find the median, mode or range or probability of more/less than ...}

(3) {Given stem and leaf but data key is e.g. $5|6 = 0.56$ 5.6 or 560 or 5 600 etc
   find the median, mode or range or probability of more/less than ...}

(No harder work yet)

Probability and Statistics: Venn

(1) {Given all the elements of A, B and ξ students complete a blank Venn diagram}

(2) {Given completed Venn diagram, students asked to list $A \cup B$, $A \cap B$, A' or B'}

(3) {Given all the elements of $A \cup B, A \cap B$ and A or B students complete Venn diagram}

(4) {Given Venn diagram where C and D are e.g. number of cat and dog owners
   write down or describe the meaning of $P(C \cap D)$, $P(C \cup D)$, $P(C')$ OR $P(D')$}

(5) Fearne carried out a survey of visitors in a water park to find out how many visitors
   go on the water slide, S and how many visitors go on the wave machine, W.

   98 visitors answer the survey in the water park

   71 visitors go on the wave machine

   56 visitors go on the both the water slide and the wave machine

   90 visitors go on the water slide or the wave machine or both

   Complete this {given blank} Venn diagram to show Fearne's data.

(6) ξ = {integers 1 to 10} OR = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

   A = {prime /even / odd /square numbers OR factors of ... OR multiples of ...}

   B = similar to different to A

   Complete this {given blank} Venn diagram for this information.