Doing better in KS3 SAT mathematics – Number and Calculation

To achieve a level 6 in KS3 mathematics you need to be confident in all these aspects:

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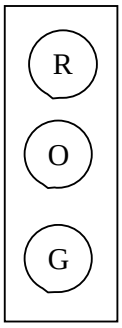
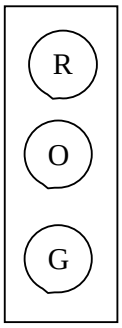
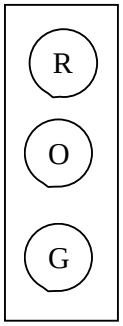
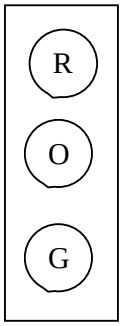
Can I ?		What can I do to improve?
Mentally recall and calculate; squares, cubes, square root and cube root. Calculate mentally other powers of 2 and 10.	R O G	Know square numbers -from 1^2 to 15^2 Know cube numbers – from 1^3 to $5^3$and 10^3 Apply above to fractions, decimals and negative number. Eg. $0.3^2 = 0.09$, $-5^2 = 25$, $-4^3 = -64$, $2^5 = 32$. Know square root of square numbers and estimate square roots of non-square numbers. Eg $\sqrt{90} \approx 9.5$ because $\sqrt{81} = 9$, $\sqrt{100} = 10$
Mentally calculate with decimals.	R O G	Know that multiplying does not always make a number larger Eg. $47 \times 1 = 47$ so $47 \times 0.1 = 4.7$ $47 \times 0.01 = 0.47$ Recognise that $9.1 \div 0.1$ can be interpreted as "How many 0.1's or tenths in 9.1?" Answer = 91
Order decimals	R O G	Know that to order decimals, digits in the same position must be compared, working from the left, beginning at the first non-zero digit. Eg. $0.02437 < 0.02452$ look at the fourth decimal place. $23.451 < 23.54$ look at the first decimal place

Approximate decimals when solving numerical problems.		Round decimals to nearest whole number or to 1 or 2 decimal places eg. 3.7452 is 4 (nearest whole number) is 3.7 (1dp) is 3.75 (2dp) Remember to select an appropriate number of decimal places. Remember when substituting numbers into expressions/formulae only round at the end of the calculation. Know significant figures. Eg 456.85 is 460 to 2 sf
Estimate		Estimate before using a calculator. Check position of a decimal point in a multiplication by estimating the answer. Eg. 67.3 × 98.42 ≈ 70 × 100 =7000
Calculate using ratios		Simplify a ratio expressed in different units. Eg. 500mm : 75cm : 2.5m 50 : 75 : 250 (All in cm-you need same units) 2 : 3 : 10 (÷ 25 to simplify) Divide a quantity into 2 or more parts. Eg. The angles in a triangle are in the ratio 6 : 5 : 7, what are the sizes of the 3 angles? 6 + 5 + 7 = 18 $180° \div 18 = 10°$ $6 \times 10° = \underline{60°}$ $5 \times 10° = \underline{50°}$ $7 \times 10° = \underline{70°}$
Calculate a percentage increase or decrease.		Know that: If something increases by 100%, it doubles. An increase of 15% will result in 115% and 115% is equivalent to 1.15 eg. Increase £12 by 15% £12 ×1.15 = £13.80 Or 15% of £12 = £1.80 £12 + £1.80 = £13.80 A decrease of 17% will result in 83% and 83% is equivalent to 0.83

+ - × ÷ fractions	R O G	Know that there must be a common denominator for + and – of fractions. Eg. $\frac{2}{3}-\frac{3}{5}=\frac{10}{15}-\frac{9}{15}=\frac{1}{15}$ Know how to multiply fractions, using cancelling to simplify. Eg. $\frac{3}{4}\times\frac{2}{9}=\frac{3\times2}{4\times9}=\frac{6}{36}=\frac{1}{6}$ You can cancel here by ÷3 and ÷ 2 Know how to use the inverse rule to divide fractions. $\div\frac{4}{7}=\times\frac{7}{4}$ $\frac{2}{3}\div\frac{4}{7}=\frac{2}{3}\times\frac{7}{4}=\frac{14}{12}=\frac{7}{6}=1\frac{1}{6}$
Understand and use the equivalence of fractions, decimals and percentages.	R O G	When solving word problems think about the equivalence of fractions, decimals and percentages. 13% of 48 = $\frac{13}{100}\times 48$ = 0.13 ×48 = 6.24 Which is the most suitable method for you? Do you have a calculator? Compare proportions using equivalence of fractions, decimals and percentages.
Use a non- calculator method for multiplying decimals?	R O G	You could use a grid method to answer this type of question, if you cannot do standard column method. e.g. 1.23 x 2.4 **×** | **1** | **0.2** | **0.03** | **2** | 2 | 0.4 | 0.06 | → 2.46 **0.4** | 0.4 | 0.08 | 0.012 | → 0.492 **↓2.952**
Order, add, subtract, multiply and divide negative numbers.	R O G	Learn +, -, ×, ÷ with negative number. Eg. (–3) – (–2) = -1 -3 × -2 = 6 Know how to use negative numbers on your calculator. Know how to substitute positive and negative numbers into formulae.

Doing better in KS3 SAT mathematics

Shape, Space and Measures

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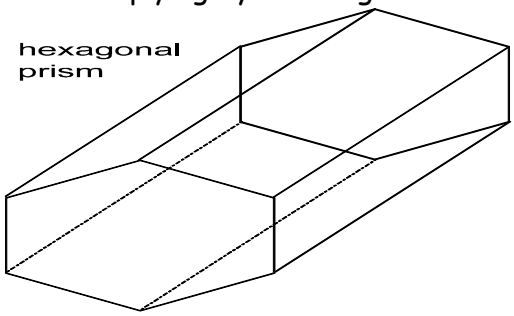
Can I?		What can I do to improve?
I can recognise and use common 2D drawings of 3D shapes.	R O G	Practice drawing 2D representations of 3D shapes using isometric paper.
I know and use the properties of quadrilaterals in classifying different types of quadrilateral.	R O G	Know of by heart:- • Angle properties • Side properties (equal and parallel) • • Lines of symmetry • Order of rotational symmetry
I can solve problems using angle and symmetry properties of polygons.	R O G	Know off by heart OR use triangles to find the sum of interior angles of any polygon. Know the number and position of lines of symmetry and the order of rotational symmetry of regular polygons.
I know angle properties of intersecting and parallel lines and explain them.	R O G	Know:- Alternate (Z) angles are equal; Corresponding angles are equal; Interior angles add up to 180°; Vertically opposite angles are equal.

I can devise instructions for computer to generate and transform shapes and paths (as in *LOGO*).	R O G	For example, Kay types the instructions to draw a regular pentagon: **repeat 5 [forward 10, left turn 72]** Complete the instructions to draw a regular hexagon. **repeat 6 [forward 10, left turn .....**
I understand and use the correct formulae for finding circumferences and area of circles.	R O G	Know these formulae:- Area of circle = πr^2. Circumference = $2\pi r$ OR πd
I understand and can solve problems involving areas of plain rectilinear figures and volume of cuboids.	R O G	Given the area or perimeter of a square or volume of a cube, I can find the lengths of any side. Calculate the volume of a prism by calculating the area of the cross-section and multiplying by the length.  for any prism volume = cross sectional area x length
I can enlarge shapes by a positive whole number scale factor.	R O G	Know that in enlargements, angles stay the same size while lengths are increased by the scale factor.

Doing better in KS3 SAT mathematics – Algebra

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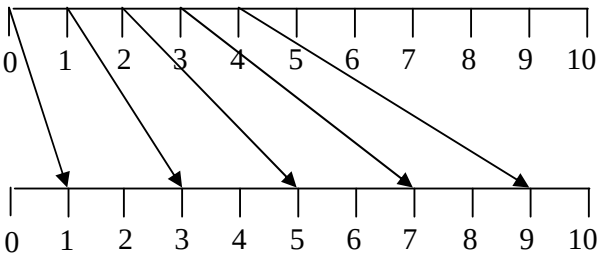
<table>
<tr><th>Can I ?</th><th></th><th>What can I do to improve?</th></tr>
<tr><td>Draw mapping diagrams for simple functions.</td><td>R
O
G</td><td>e.g. x → 2x + 1
 

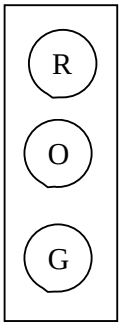
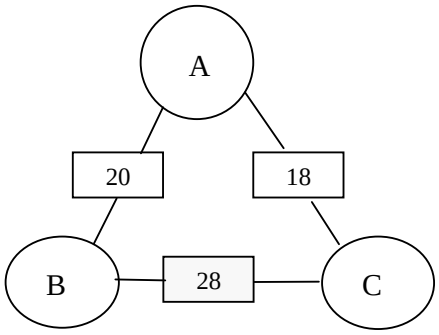
Practise mappings of the form x → ax + c
where a and c are numbers and extend the mappings to include negative and fractional values.</td></tr>
<tr><td>Solve linear equations with whole number coefficients</td><td>R
O
G</td><td>e.g. 9y + 3 = 5y + 13.

9y + 3 = 5y + 13 — Partition 9y into 4y + 5y
4y + 5y + 3 = 5y + 13 — Remove 5y from both sides
4y + 3 = 13 — 13 is equal to 10 + 3, so
4y = 10 — 4 x 2.5 = 10, so
y = 2.5

e.g $\frac{2}{3}=\frac{t}{6}$

$\frac{2}{3}=\frac{t}{6}$ — Find the lowest common denominator, i 6 and convert the thirds to sixths

$\frac{4}{6}=\frac{t}{6}$
Clearly 4 = t</td></tr>
</table>

		e.g $\frac{2}{3}=\frac{5}{r}$ $\frac{2}{3}=\frac{5}{r}$ Find the lowest common denominator, i 3r and convert both fractions so they have this denominator $\frac{2r}{3r}=\frac{15}{3r}$ So 2r must equal 15 2r = 15 2 x 7.5 is equal to 15, so r = 7.5
Formulate linear equations		Practise 'I think of a number and …….' e.g. In an arthimagon, the number in a square is the sum of numbers in the 2 circles on either side of it. In this triangular arithmagon, what could the numbers A, B and C be?  So here A + C = 18, A + B = 20 and B + C = 28 Let x stand for the number in the top circle. Form expressions for the numbers in the other two circles, (20 – x) and (18 – x). Then form an equation in x and solve it (20 – x) + (18 – x) = 28 E.g On Kylie's next birthday, half of her age will be 16. How old is Kylie now ?

Can I?		**What can I do to improve?**
Describe the next term of linear sequence in words, or the nth term where the sequence is linear.	R O G	Practice generating terms of a linear sequence using Term-to-term and position-to-term definiftions of the sequence. e.g T (n) = 20 – 2n This generates the sequence 18, 16, 14, 12, 10, 8, 6, 4, 2, 0, -2, …… What is the next term in the sequence? What is the 20^{th} term in this sequence? e.g A linear function generates these numbers; 5, 8, 11, 14, 17, …… What is the function?
Coordinate plottings and interpreting features of graphical representations	R O G	Practise plotting coordinates in all 4 quadrants from a linear function e.g y = 2x – 3 (-3, -9), (-2, -7), (-1, -5), (0, -3), (1, -1), (2, 1) ……. Plot the points. Observe the points lie in a straight line and draw the line. Note, any coordinate pair that does not lie on the line Does not satisfy the equation.

Doing better in KS3 SAT mathematics - Data Handling

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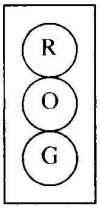
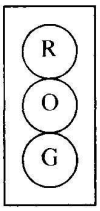
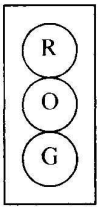
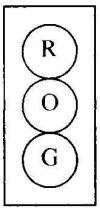
Can I?		What can I do to improve?
Construct and interpret frequency diagrams?		Working with a friend or relative, find some sets of data from a textbook. **Take turns to construct frequency diagrams and** take turns in describing something that the graph tells you. Keep going as long as possible until you have exhausted all possibilities. Then try another graph and do the same.
Construct pie charts? Draw conclusions from scatter diagrams, and have a basic understanding of correlation?		Remember that there are 360 degrees in a circle. Important facts: $\frac{1}{2}$ circle = 180 degrees $\frac{1}{4}$ circle = 90 degrees 1/3 circle = 120 degrees Practice using a protractor, and ask a friend to judge a pie chart you have drawn. Remember that each sector of a pie chart represents the proportion in each category. Remember that correlation can be positive or negative. If there is no correlation, it is not possible to draw a line of best fit.
Identify all the possible outcomes when dealing with a combination of two experiments?		Remember to list outcomes systematically. Hint: Make sure to write a probability either as a fraction, a decimal or a percentage. Remember that the phrases " at random " and " fair " are often used and are just ways of saying that outcomes are equally likely.
Use my knowledge that the total probability of all the mutually exclusive outcomes of an experiment is 1?		Remember that probabilities range between 0 and 1. Always check the total probability of all the mutually exclusive outcomes of an experiment is 1.