

Reformed Functional Skills Maths

Need to know – Level 1: Number

Name _____ Date _____

NUMBER

<p>L1.6 A square number is a number times itself so $2^2 = 2 \times 2 = 4$ $3^2 = 3 \times 3 = 9$</p>	<p>1, 4, 9, 16, 25, 36, 49, 64, 81, 100</p>										
<p>L1.7 Order of operations: BIDMAS Brackets, Indices (Powers), Division/Multiplication, Addition/Subtraction</p>	<p>Calculators follow BIDMAS. In multi-step calculations it is better to total at each step. E.g. when finding the mean, add all the values, then press <input type="text" value="="/> button before you press divide.</p>										
<p>PSE3c, PSL1e – see p11 Reverse calculations are often needed to check answers.</p>	<p>E.g. for $20 \times 5 = 100$ you could use $100 \div 5 = 20$ for the check or $100 \div 20 = 5$</p>										
<p>L1.12 Rounding Note where you are asked to round to. E.g. to nearest ten, to one decimal place, etc. 5.5, 5.6, 5.7, 5.8, 5.9 round to 6 5.1, 5.2, 5.3, 5.4 round to 5 In multi-step tasks do not round until the last step</p>	<p>BUT you need to think practically... Buses can sit 55 people. There are 176 people. How many buses do you need? $176 \div 55 = 3.2$ so you need 4 buses</p>										
<p>L1.2 Negative numbers If finding the difference between a positive number and a negative, count to zero, and then to the other number. $12 - (-4) = 16$ $6 - 13 = -7$</p>	<p>E.g. At midday it is 12°C but by midnight it is -4°C. How many degrees did the temperature fall? <i>i.e. what is the difference between 12°C and -4°C?</i> 12 down to $0 = 12$ degrees 0 down to $-4 = 4$ degrees $12 + 4 = 16$ so the temperature fell by 16°C. At midday it was 6°C but by dawn the temperature had dropped by 13°C. What was the temperature at dawn? 6 down to $0 = 6^{\circ}$ $13 - 6 = 7$ 0 down 7 degrees = -7°C The temperature at dawn is -7°C</p>										
<p>L1.17 Best buys When comparing offers read the question carefully. Check for 'free for the first three months' or 'buy three get one free'. Check the units e.g. litres and ml, grams and kilograms. Convert them to the same unit. Check prices: £ or p. Convert to the same unit. If comparing 'mobile costs' or 'family tickets' check details such as 'line rental' or 'number of adults & children'. Work out the total bill e.g. for a year for both offers, or prices for one month.</p>	<p>Offer One: potatoes 500g for 48p Offer Two: potatoes 2 kg for £1.65 <i>Need to know $1000\text{g} = 1\text{kg}$</i></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">Offer One:</td> <td>500 g for £0.48</td> </tr> <tr> <td>x 2</td> <td>1 kg for £0.96</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td>Offer Two:</td> <td>2 kg for £1.65</td> </tr> <tr> <td>÷ 2</td> <td>1 kg for £0.83</td> </tr> </table> <p>Now both expressed as 1 kg, and in £, can compare. <u>Offer Two is the cheaper offer</u></p>	Offer One:	500 g for £0.48	x 2	1 kg for £0.96			Offer Two:	2 kg for £1.65	÷ 2	1 kg for £0.83
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<p>L1.17 Ratio and proportion Draw up a ratio table with the information given in the question. Use it to see what you need to times or divide by.</p> <p>If dividing by a ratio, remember Adam Drives Mercedes: add, divide, multiply</p> <p>If you know one of the payments, use a ratio table</p>	<p>A cake for 4 people needs 250g of flour and 125g of butter. How much flour and butter for a cake for 12 people?</p> <div style="text-align: right; border: 1px solid black; padding: 2px; display: inline-block;">X 3</div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="padding: 5px;">people</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">12</td> </tr> <tr> <td style="padding: 5px;">flour g</td> <td style="padding: 5px;">250</td> <td style="padding: 5px;">750</td> </tr> <tr> <td style="padding: 5px;">butter g</td> <td style="padding: 5px;">125</td> <td style="padding: 5px;">375</td> </tr> </table> <p>Megan has done 5 hours work and Harriet 3 hours. They are paid £60 between them. How much is Megan paid, and how much is Harriet paid?</p> <p>Add: $5+3 = 8$ hours Divide: $60 \div 8 = £7.50$ per hour Multiply: $5 \times 7.50 = £37.50$ to Megan $3 \times 7.50 = £22.50$ to Harriet</p> <p>Pippa has worked for 10 hours and been paid £150. Sinead has worked for 6 hours. She is paid at the same rate. How much is she paid?</p> <p>$150 \div 10 = £15$ per hour</p> <div style="text-align: right; border: 1px solid black; padding: 2px; display: inline-block;">X 15</div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">hours</td> <td style="padding: 5px;">paid</td> </tr> <tr> <td style="padding: 5px;">Pippa</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">150</td> </tr> <tr> <td style="padding: 5px;">Sinead</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">90</td> </tr> </table> <p style="text-align: right;">$6 \times 15 = \underline{90}$</p>	people	4	12	flour g	250	750	butter g	125	375		hours	paid	Pippa	10	150	Sinead	6	90
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NUMBER: CALCULATOR

<p>L1.9 Fractions of an amount: divide by the denominator, times by the numerator.</p>	<p>To find $\frac{3}{8}$ of 240 $240 \div 8 = 30$ $30 \times 3 = \underline{90}$</p>
<p>L1.14 Percentages To find a percentage of an amount, multiply the amount by the %</p>	<p>E.g. to find 45% of £360 $360 \times 45 \div 100 = 162$ Or $360 \times 45\%$ shift (on Casio</p>
<p>L1.16 To compare fractions, decimals and % convert all to the same i.e. all fractions, all decimals, or all %s. To convert a fraction to a percentage: divide the numerator by the denominator then $\times 100$. To convert a decimal to a % multiply by 100</p>	<p>E.g. $\frac{15}{20} = 15 \div 20 = 0.75$ $0.75 \times 100 = 75 \%$</p>

Reformed Functional Skills Maths

Need to know – Level 1: Number

Name _____ Date _____

NUMBER: NON-CALCULATOR

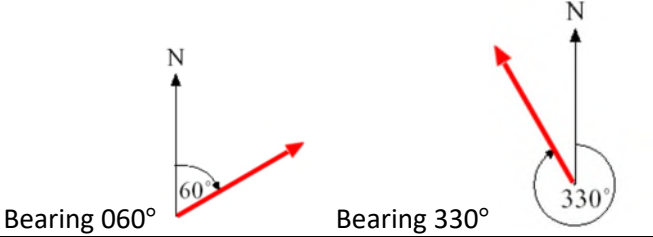
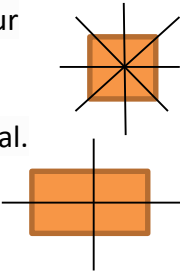


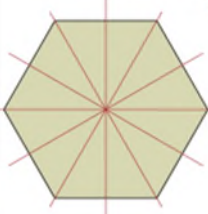
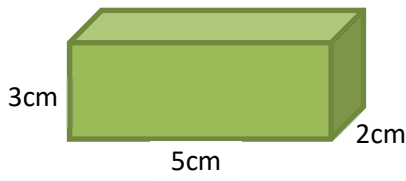
<p>L1.3 X 10 – move the decimal point one place to right X 100 – move the decimal point two places X 1000 = move the decimal point three places ÷ 10 = move the decimal point one place to left ÷ 100 = move the decimal point two places ÷ 1000 = move the decimal point three places</p>	<p>E.g. $5.12 \times 10 = 51.2$ $5.12 \times 100 = 512$ $5.12 \times 1000 = 5120$ $673.9 \div 10 = 67.39$ $673.9 \div 100 = 6.739$ $673.9 \div 1000 = 0.6739$</p>																								
<p>L1.16 Fractions Decimals Percentages Learn the most common fractions and their decimal and % equivalents</p> <table style="margin-left: 40px;"> <tr> <td style="text-align: right;">Numerator</td> <td style="text-align: center;"><u>2</u></td> </tr> <tr> <td style="text-align: right;">Denominator</td> <td style="text-align: center;">3</td> </tr> </table>	Numerator	<u>2</u>	Denominator	3	<table style="width: 100%;"> <tr> <td>$\frac{1}{4}$</td> <td>= 0.25</td> <td>x 100</td> <td>= 25%</td> </tr> <tr> <td>$\frac{1}{2}$</td> <td>= 0.5</td> <td></td> <td>= 50%</td> </tr> <tr> <td>$\frac{3}{4}$</td> <td>= 0.75</td> <td></td> <td>= 75%</td> </tr> <tr> <td>$\frac{1}{3}$</td> <td>= 0.33</td> <td></td> <td>= 33%</td> </tr> <tr> <td>$\frac{2}{3}$</td> <td>= 0.67</td> <td></td> <td>= 67%</td> </tr> </table>	$\frac{1}{4}$	= 0.25	x 100	= 25%	$\frac{1}{2}$	= 0.5		= 50%	$\frac{3}{4}$	= 0.75		= 75%	$\frac{1}{3}$	= 0.33		= 33%	$\frac{2}{3}$	= 0.67		= 67%
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$\frac{2}{3}$	= 0.67		= 67%																						
<p>L1.8 To find an equivalent fraction multiply both the numerator and the denominator by the same number. To simplify a fraction divide both numerator and denominator by the same factor till you can't divide any more.</p>	<p>E.g. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{40}{80}$ E.g. $\frac{6}{12}$ divide both by 2 $\frac{3}{6}$ check $\frac{3}{6}$ divide both by 3 $\frac{1}{2}$ stop</p>																								
<p>L1.9 To find $\frac{1}{4}$ of an amount with no calculator, divide by 2 (to find $\frac{1}{2}$) then divide by 2 again. OR Divide by 4. To find $\frac{3}{4}$ of an amount, find $\frac{1}{4}$ then multiply by 3</p>	<p>E.g. Find one quarter of 24 $24 \div 2 = 12$ $12 \div 2 = \underline{6}$ Or $24 \div 4 = \underline{6}$ E.g. $\frac{3}{4}$ of 12 = $12 \div 4 = 3$ $3 \times 3 = \underline{9}$</p>																								
<p>L1.14 A percentage is a fraction out of 100. To find 10% without a calculator, divide by 10 To find 15%, find 10%, divide it by 2 to find 5%, add the two together</p>	<p>E.g. $15\% = 15/100$ Find 15% of £45 <table style="width: 100%;"> <tr> <td>10% of £45</td> <td>= £4.50</td> </tr> <tr> <td><u>5%</u> of £45</td> <td>= $4.50 \div 2$ = <u>£2.25</u></td> </tr> <tr> <td>15% Total</td> <td>= £6.75</td> </tr> </table> </p>	10% of £45	= £4.50	<u>5%</u> of £45	= $4.50 \div 2$ = <u>£2.25</u>	15% Total	= £6.75																		
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<p>L1.11 Decimals: Non-calculator To add or subtract decimals, line up the numbers in a column under the decimal point.</p>	<p>E.g. to add $1.2 + 31.6 + 0.43$</p> <table style="margin-left: 40px;"> <tr><td>1.20</td><td>+</td></tr> <tr><td>31.60</td><td></td></tr> <tr><td><u>0.43</u></td><td></td></tr> <tr><td><u>33.23</u></td><td></td></tr> </table>	1.20	+	31.60		<u>0.43</u>		<u>33.23</u>																	
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<p>L1.11 To multiply decimals calculate as if there were no decimal points. Then put them back into the answer to the same number of places that were in the question.</p>	<p>E.g. 1.5×3 $15 \times 3 = 45$ Ans = 4.5 1.5×2.5 $15 \times 25 = 375$ Ans = 3.75</p>																								
<p>L1.11 To divide by a decimal multiply both numbers by a factor of ten till you have a whole number to divide by. Then divide as normal.</p>	<p>E.g. $70 \div 0.5$ $0.5 \times 10 = 5$ $70 \times 10 = 700$ $700 \div 5 = 140$</p> <table style="margin-left: 40px;"> <tr><td>5</td><td> </td><td>140</td></tr> <tr><td></td><td> </td><td>700</td></tr> </table>	5		140			700																		
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Reformed Functional Skills Maths

Need to know – Level 1: Measures

Name _____ Date _____







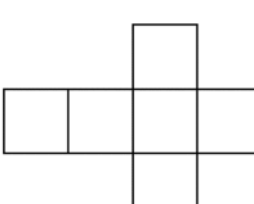
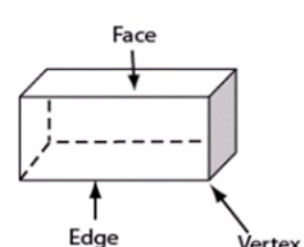
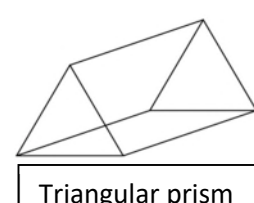

SHAPE, MEASURES, TIME.

<p>L1.26 Angles Acute, right angle, obtuse, straight line, reflex. Angles round a point add up to 360°.</p>	<p>Acute = less than 90° (a cute little angle) Right angle = 90° Obtuse = greater than 90 and less than 180° Straight line = 180° Reflex = between 180 and 360°</p>						
<p>L1.26 Bearings are used to measure direction. You always measure them clockwise from north, using 3 digits. Images: https://www.cimt.org.uk/projects/mepres/book8/bk8i11/bk8_11i3.htm</p>							
<p>L1.24 2D Shapes: triangle, rectangle, parallelogram, square, trapezium, pentagon, hexagon, circle.</p> <p>Demonstrate an understanding of line symmetry and knowledge of the relative size of angles A triangle has three sides. A scalene triangle has all three sides different and no lines of symmetry. An isosceles triangle has two sides the same length and one line of symmetry. An equilateral triangle has three equal length sides and three lines of symmetry through the corners.</p> <p>A square has four equal sides and four right angles. It has four lines of symmetry.</p> <p>In a rectangle opposite sides are equal. There are four right angles. It has two lines of symmetry, through the sides only.</p> 	<p>Know the properties of 2D shapes: A parallelogram has four sides, opposite sides are parallel and equal lengths. It has no lines of symmetry.</p>  <p>A trapezium has four sides. One pair of sides is parallel. The sides <i>may</i> all be of different lengths. It may have no lines of symmetry (or one for an isosceles trapezium).</p>  <p>A pentagon has 5 sides. A <i>regular</i> pentagon has five lines of symmetry. A hexagon has six sides. A <i>regular</i> hexagon has 6 lines of symmetry: 3 through the corners and 3 through the sides.</p>  <p>Image: https://en.wikipedia.org/wiki/Hexagon</p>						
<p>L1.22 The perimeter of a 2D shape is the distance all the way round the edge.</p> <p>L1.22 Area of rectangle = length × width</p> <p>L1.23 Volume of cuboid = length × width × depth</p> <p>Remember the units:</p> <table border="0"> <tr> <td>Length</td> <td>cm, m</td> </tr> <tr> <td>Area square units</td> <td>cm², m²</td> </tr> <tr> <td>Volume cubic units</td> <td>cm³, m³</td> </tr> </table>	Length	cm, m	Area square units	cm ² , m ²	Volume cubic units	cm ³ , m ³	 <p>To find the perimeter ADD the lengths of the sides Perimeter = 5 + 3 + 5 + 3 = <u>16 cm</u></p> <p>To find the area MULTIPLY the length x the width Area = 5 x 3 = <u>15 cm²</u></p> <p>To find the volume MULTIPLY the area of the face x the depth Volume = 5 x 3 = 15 (the face) x 2 (the depth) = 15 x 2 = <u>30 cm³</u></p>
Length	cm, m						
Area square units	cm ² , m ²						
Volume cubic units	cm ³ , m ³						

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Need to know – Level 1: Measures

Name _____ Date _____

<p>3D solid objects: cube, cuboid, cylinder, pyramid, prism</p> <p>L1.25 Recognise the net of a cube, cuboid, cylinder, pyramid or prism.</p> <p>Be able to draw the plan (top view) and elevation (front and side view) of a cube and a cuboid</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  Cone </div> <div style="text-align: center;">  Cylinder </div> <div style="text-align: center;">  Pyramid </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">  Sphere </div> <div style="text-align: center;">  Cuboid </div> <div style="text-align: center;">  Cube </div> </div> <p>Net of a cube</p> 	<p>Know the properties of 3D shapes.</p> <p>A cuboid has six faces. It has 8 vertices and 12 edges.</p> <p>A cube has six faces, all squares. It has 8 vertices and 12 edges.</p> <p>A prism is a solid like a cuboid or a Toblerone box where the cross section (the front face) stays the same all the way through. Imagine slicing through a cuboid loaf of bread.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  Triangular prism </div> </div> <p>3D shape images: https://www.mathsisfun.com/</p>																								
<p>Measures</p> <p>L1.20 Metric units: mm, cm, m, km, g, kg, ml, cl, litres</p> <p>Kilo = x 1000 Milli = ÷ 1000 Centi = ÷ 100</p>	<p>Metric conversions: LEARN THESE</p> <p>Length: m 1cm = 10mm 1m = 100cm 1km = 1000m</p> <p>Weight: g 1kg = 1000g</p> <p>Capacity: l 1 litre = 1000 ml</p> <p>E.g. 5 km = 5000m, 236 cm = 2.36 m</p>																								
<p>E2.7 L1.20 Time</p> <p>60 seconds = one minute 60 minutes = one hour 24 hours = one day 7 days in a week 365 /366 days in a year 52 weeks in a year 12 months in a year</p> <p>Note: 3.5 hours does not mean 3 hours 50 minutes or 3 hours 5 minutes. (3.5 hours means 3 and a half hours or 3 hours 30 minutes) Work in seconds or minutes (60), not in decimal time. Use the  button on the Casio.</p>	<p>Learn the days in the months</p> <table border="0"> <tr><td>January</td><td>31 days</td></tr> <tr><td>February</td><td>28/29 days</td></tr> <tr><td>March</td><td>31 days</td></tr> <tr><td>April</td><td>30 days</td></tr> <tr><td>May</td><td>31 days</td></tr> <tr><td>June</td><td>30 days</td></tr> <tr><td>July</td><td>31 days</td></tr> <tr><td>August</td><td>31 days</td></tr> <tr><td>September</td><td>30 days</td></tr> <tr><td>October</td><td>31 days</td></tr> <tr><td>November</td><td>30 days</td></tr> <tr><td>December</td><td>31 days</td></tr> </table>	January	31 days	February	28/29 days	March	31 days	April	30 days	May	31 days	June	30 days	July	31 days	August	31 days	September	30 days	October	31 days	November	30 days	December	31 days
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Reformed Functional Skills Maths

Need to know – Level 1: Measures - Data

Name _____ Date _____

<p>Money</p> <p>E3.10 100 p = £1.00 Write your answer in £ (usually) including the £ sign and two decimal places.</p>	<p>Convert to all in £ or all in p E.g. £3.50 + 46p + £1.25 = 3.50 + 0.46 + 1.25 = <u>£5.21</u></p>									
<p>L1.21 Scale</p> <p>Scale is a ratio. Use a ratio table to help you.</p> <table border="1" data-bbox="129 539 735 696"> <tr> <td>In metres</td> <td>x 100 in cm</td> <td>Squares: Divide by 50cm</td> </tr> <tr> <td>2m</td> <td>200 cm</td> <td>4 squares</td> </tr> <tr> <td>4m</td> <td>400 cm</td> <td>8 squares</td> </tr> </table>	In metres	x 100 in cm	Squares: Divide by 50cm	2m	200 cm	4 squares	4m	400 cm	8 squares	<p>If the squares on the grid in question papers are 50 cm, to represent a shape 2m x 4m Convert into cm 2 x 100 = 200 cm 4 x 100 = 400 cm Divide by 50cm 200 ÷ 50 = 4 squares 400 ÷ 50 = 8 squares</p>
In metres	x 100 in cm	Squares: Divide by 50cm								
2m	200 cm	4 squares								
4m	400 cm	8 squares								
<p>L1.21, L2.18 If given a map, measure accurately in cm or mm as indicated in the question</p>	<p>E.g. Scale 1 cm on map is 10 km on the ground</p> <table border="1" data-bbox="858 741 1422 907"> <tr> <td>On map cm</td> <td>On ground in m (actual distance) x 10 km</td> </tr> <tr> <td>5 cm</td> <td>50 km</td> </tr> <tr> <td>3.7 cm</td> <td>37 km</td> </tr> </table>	On map cm	On ground in m (actual distance) x 10 km	5 cm	50 km	3.7 cm	37 km			
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5 cm	50 km									
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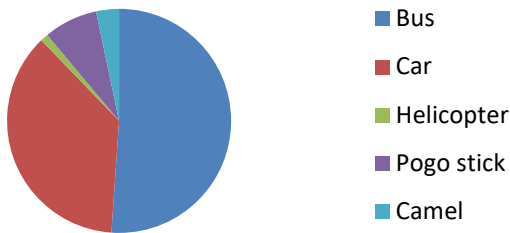
DATA

<p>L1.29 Mean</p> <p>If a question asks for 'average', find the mean. To find the mean add all the values Divide by the number of values To find the range, find the highest value, subtract the lowest value <i>If not in order, put numbers in order first to check you have the highest and lowest values.</i></p>	<p>5, 6, 8, 10, 12, 13</p> <p>Add: total = 54 Divide 54 ÷ 6 = 9 Mean is <u>9</u></p> <p>Range = 13 – 5 = 8 Range is <u>8</u></p>										
<p>L1.27 Tables</p> <p>If asked to draw a table, look carefully at what you are asked to show. You need a column heading for each item. Marks are awarded for the design of the table and the accuracy of transferring the data into your table.</p>	<p>E.g. Quarterly sales Find the data or read from the graph.</p> <table border="1" data-bbox="815 1391 1398 1628"> <thead> <tr> <th>Quarter</th> <th>Sales per quarter</th> </tr> </thead> <tbody> <tr> <td>Q1 Jan - Mar</td> <td>Total of sales for Jan, Feb and Mar</td> </tr> <tr> <td>Q2 Apr - Jun</td> <td>130</td> </tr> <tr> <td>Q3 Jul – Sept</td> <td>230</td> </tr> <tr> <td>Q4 Oct - Dec</td> <td>300</td> </tr> </tbody> </table>	Quarter	Sales per quarter	Q1 Jan - Mar	Total of sales for Jan, Feb and Mar	Q2 Apr - Jun	130	Q3 Jul – Sept	230	Q4 Oct - Dec	300
Quarter	Sales per quarter										
Q1 Jan - Mar	Total of sales for Jan, Feb and Mar										
Q2 Apr - Jun	130										
Q3 Jul – Sept	230										
Q4 Oct - Dec	300										
<p>L1.27 If asked to draw a graph, a bar graph is usually the best option. Work out the scale on the y axis. It must go up in equal jumps Label the x axis (e.g. months, flavour of crisps) Label the y axis (e.g. frequency, no. of people) Leave gaps between the columns.</p>	<p>If continuing a graph, follow what they have started e.g. a line graph, points joined with straight lines.</p> <p>You could be asked to add points to a scatter diagram.</p>										
<p>L1.27 If drawing a pictogram, choose pictures that are easy to draw quickly and neatly. Choose your scale e.g.  = 5 cars. Write the key.</p>	<p>Line the pictures up underneath the first row in neat lines, so that the 'biggest' row is clearly the longest and the 'smallest' the shortest.</p>										

L1.27 Pie charts

Circle = 360°. Divide the circle by the total (e.g. people in a survey) to find degrees per item. Multiply by the no. items in each category. Draw the chart accurately. To draw a sector which is more than 180°, draw the other sectors first. The space that is left is the remaining sector.

Travelling to college



90 people were asked how they came to college. Complete the table and draw an accurate pie chart.

$360 \div 90 = 4^\circ$ per person

Transport	No. of people	x 4	Degrees on the pie chart
Bus	46	x 4	184
Car	33	x 4	132
Helicopter	1	x 4	4
Pogo stick	7	x 4	28
Camel	3	x 4	12

Probability

L1.30 If the probability is 0, the event is **impossible**.

The probability of snow in June is **unlikely**.
The probability of getting a head on a fair coin is $\frac{1}{2}$ or **evens**.

The probability that it will rain in November is **likely**.

If the probability is 1, the event is **certain**.

L1.31 Chance of throwing a 6 on a fair die is $\frac{1}{6}$.
The chance of throwing an even number of a fair die: even numbers 2, 4, 6 (3 numbers)

Numbers on a die = 6

Even numbers on a die = $\frac{3}{6}$, or $\frac{1}{2}$.

Probability is expressed in fractions, or decimals, or percentages.

The total is 1, or 100%

Find the probability of a student coming to college on a camel.

Means of travelling to college

Bus	Car	Helicopter	Camel
0.51	0.36	0.08	?

Add: $0.51 + 0.36 + 0.08 = 0.95$

Subtract: $1 - 0.95 = 0.05$

The probability of a student coming to college on a camel is 0.05.

L2.26 Reading from tables

To find a probability from a table, find the total. That is the denominator.

Then find the items that fit the given criterion.

You may need to add some numbers together.

This is the numerator.

Express the probability as a fraction.

I pick a student at random. What is the probability that this student watches EastEnders?

Looking at all the students, so $\frac{\quad}{105}$

All those who watch EastEnders 47

Ans $\frac{47}{105}$

What is the probability that a girl watches Emmerdale?

Only looking at girls $\frac{\quad}{80}$

Watches Emmerdale 16

Ans $\frac{16}{80}$

	EASTENDERS	CORONATION ST.	EMMERDALE	TOTAL
BOYS	12	10	3	25
GIRLS	35	29	16	80
TOTAL	47	39	19	105

Subject content – Reformed FUNCTIONAL SKILLS MATHEMATICS 2018

(takes effect from September 2019)

✓ indicates main **content** and **problem-solving skill(s)** covered in this resource, although these will vary with the student group and how the resource is used by the teacher. → or ← = not covered but included to show progression across levels (*content at each level subsumes and builds upon the content at lower levels*). Full content at: DfE (Feb 2018) <https://www.gov.uk/government/publications/functional-skills-subject-content-mathematics>

1. Fundamental mathematical knowledge and skills These must be demonstrated in their own right, **both with and without a calculator**, in addition to being used to solve problems or complete tasks.

Entry Levels 2 & 3	Level 1	Level 2
Using numbers and the number system (N)		
1. Count reliably up to 100 items 2. Read, write, order and compare numbers up to 200 3. Recognise and sequence odd and even numbers up to 100 4. Recognise and interpret the symbols +, −, x, ÷ and = appropriately 5. Add and subtract two-digit numbers 6. Multiply whole numbers in the range 0x0 to 12x12 (times tables) → 7. Know the number of hours in a day and weeks in a year. → 8. Divide two-digit whole numbers by single-digit whole numbers and express remainders → 9. Approximate by rounding to the nearest 10, and use this rounded answer to check results → 10. Recognise simple fractions (halves, quarters and tenths) of whole numbers and shapes → 11. Read, write and use decimals to one decimal place → E3.1 Count, read, write, order and compare numbers up to 1000 E3.2 Add and subtract using three-digit whole numbers → E3.3 Divide three-digit whole numbers by single and double digit whole numbers and express remainders → E3.4 Multiply two-digit whole numbers by single and double digit whole numbers → E3.5 Approximate by rounding numbers less than 1000 to the nearest 10 or 100 and use this rounded answer to check results → E3.6 Recognise and continue linear sequences of numbers up to 100 E3.7 Read, write and understand thirds, quarters, fifths and tenths including equivalent forms → E3.8 Read, write and use decimals up to two decimal places → E3.9 Recognise and continue sequences that involve decimals	L1.1 Read, write, order and compare large numbers (up to one million) L1.2 Recognise and use positive and negative numbers ✓ L1.3 Multiply and divide whole numbers and decimals by 10, 100, 1000 ✓ L1.4 Use multiplication facts and make connections with division facts L1.5 Use simple formulae expressed in words for one or two-step operations L1.6 Calculate the squares of one-digit and two-digit numbers ✓ L1.7 Follow the order of precedence of operators ✓ L1.8 Read, write, order and compare common fractions and mixed numbers ✓ L1.9 Find fractions of whole number quantities or measurements ✓ L1.10 Read, write, order and compare decimals up to three decimal places ✓ L1.11 Add, subtract, multiply and divide decimals up to 2 decimal places ✓ L1.12 Approximate by rounding to a whole number or to one or two decimal places ✓ L1.13 Read, write, order and compare percentages in whole numbers L1.14 Calculate percentages of quantities, including simple percentage increases / decreases by 5% and multiples thereof ✓ L1.15 Estimate answers to calculations using fractions and decimals L1.16 Recognise and calculate equivalences between common fractions, percentages and decimals ✓ L1.17 Work with simple ratio and direct proportions ✓	L L2.1 Read, write, order and compare positive and negative numbers of any size L2.2 Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation ← L2.3 Evaluate expressions and make substitutions in given formulae in words and symbols L2.4 Identify and know the equivalence between fractions, decimals and percentages ← L2.5 Work out percentages of amounts and express one amount as a percentage of another ← L2.6 Calculate percentage change (any size increase and decrease), and original value after percentage change ← L2.7 Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers L2.8 Express one number as a fraction of another L2.9 Order, approximate and compare decimals L2.10 Add, subtract, multiply and divide decimals up to three decimal places ← L2.11 Understand and calculate using ratios, direct proportion and inverse proportion ← L2.12 Follow the order of precedence of operators, including indices ←

1. Fundamental mathematical knowledge and skills These must be demonstrated in their own right, **both with and without a calculator**, in addition to being used to solve problems or complete tasks.

Entry Level 3	Level 1	Level 2
Using common measures, shape and space (MSS)		
<p>E3.10 Calculate with money using decimal notation & express money correctly in writing in pounds & pence ✓</p> <p>E3.11 Round amounts of money to the nearest £1 or 10p</p> <p>E3.12 Read, measure and record time using am and pm</p> <p>E3.13 Read time from analogue and 24 hour digital clocks in hours and minutes</p> <p>E3.14 Use and compare measures of length, capacity, weight and temperature using metric or imperial units to the nearest labelled or unlabelled division</p> <p>E3.15 Compare metric measures of length including millimetres, centimetres, metres and kilometres →</p> <p>E3.16 Compare measures of weight including grams and kilograms →</p> <p>E3.17 Compare measures of capacity including millilitres and litres →</p> <p>E3.18 Use a suitable instrument to measure mass and length</p> <p>E3.19 Sort 2-D and 3-D shapes using properties including lines of symmetry, length, right angles, angles including in rectangles and triangles →</p> <p>E3.20 Use appropriate positional vocabulary to describe position and direction inc. eight compass points and including full/half/quarter turns →</p>	<p>L1.18 Calculate simple interest in multiples of 5% on amounts of money</p> <p>L1.19 Calculate discounts in multiples of 5% on amounts of money</p> <p>L1.20 Convert between units of length, weight, capacity, money and time, in the same system ✓</p> <p>L1.21 Recognise and make use of simple scales on maps and drawings ✓</p> <p>L1.22 Calculate area and perimeter of simple shapes including those that are made up of a combination of rectangles ✓</p> <p>L1.23 Calculate the volumes of cubes and cuboids ✓</p> <p>L1.24 Draw 2-D shapes and demonstrate an understanding of line symmetry & knowledge of the relative size of angles ✓</p> <p>L1.25 Interpret plans, elevations and nets of simple 3-D shapes ✓</p> <p>L1.26 Use angles when describing position and direction, and measure angles in degrees ✓</p>	<p>L2.13 Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting</p> <p>L2.14 Convert between metric and imperial units of length, weight and capacity using a a) conversion factor and b) conversion graph ←</p> <p>L2.15 Calculate using compound measures including speed, density and rates of pay</p> <p>L2.16 Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles) ←</p> <p>L2.17 Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders) ←</p> <p>L2.18 Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements ✓</p> <p>L2.19 Use coordinates in 2-D, positive & negative, to specify the positions of points</p> <p>L2.20 Understand and use common 2-D representations of 3-D objects ←</p> <p>L2.21 Draw 3-D shapes to include plans and elevations ←</p> <p>L2.22 Calculate values of angles and/or coordinates with 2-D and 3-D shapes ←</p>

1. Fundamental mathematical knowledge and skills These must be demonstrated in their own right, **both with and without a calculator**, in addition to being used to solve problems or complete tasks.

Entry Level 3	Level 1	Level 2
Handling information and data (HD)		
<p>E3.21 Extract information from lists, tables, diagrams and charts and create frequency tables →</p> <p>E3.22 Interpret information, to make comparisons and record changes, from different formats including bar charts and simple line graphs →</p> <p>E3.23 Organise and represent information in appropriate ways including tables, diagrams, simple line graphs and bar charts →</p>	<p>L1.27 Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs ✓</p> <p>L1.28 Group discrete data and represent grouped data graphically</p> <p>L1.29 Find the mean and range of a set of quantities ✓</p> <p>L1.30 Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities to compare the likelihood of events ✓</p> <p>L1.31 Use equally likely outcomes to find the probabilities of simple events and express them as fractions ✓</p>	<p>L2.23 Calculate the median and mode of a set of quantities</p> <p>L2.24 Estimate the mean of a grouped frequency distribution from discrete data ←</p> <p>L2.25 Use the mean, median, mode and range to compare two sets of data ←</p> <p>L2.26 Work out the probability of combined events including the use of diagrams and tables, including two-way tables ✓</p> <p>L2.27 Express probabilities as fractions, decimals and percentages ←</p> <p>L2.28 Draw and interpret scatter diagrams and recognise positive and negative correlation</p>

2. Mathematical problem solving (at all levels of Functional Mathematics)

Although underpinning knowledge is tested in its own right, problem solving is a core element of Functional Skills mathematics yet should not obscure or add additional mathematical complexity beyond the level of the qualification. Defining problem solving is a challenge but the attributes below may help. Not all (often just one) of the listed attributes must be present in a single task for it to be considered to be problem solving. ✓ indicates why all or parts of this resource can be considered to be problem solving.

Source: DfE (Feb 2018) <https://www.gov.uk/government/publications/functional-skills-subject-content-mathematics>.

One or more of the following attributes may be present in a single task for it to be considered problem solving.

A Tasks that have little or no scaffolding: there is little guidance given to the student beyond a start point and a finish point. Questions do not explicitly state the mathematical process(es) required for the solution.	
B Tasks that provide for multiple representations, such as use of a sketch or a diagram as well as calculations.	
C The information is not given in mathematical form or in mathematical language; or there is a need for the results to be interpreted or methods evaluated, for example, in a real-world context.	
D Tasks have a variety of techniques that could be used.	
E The solution requires understanding of the processes involved rather than just application of the techniques.	

KEY: MCA = appropriate mathematical content area(s). NS = Using numbers and the number system. MS = Using common measures, shape and space. HD = Handling information and data.

¹A **simple mathematical problem** requires **working through one step or process**. At Entry Level it is expected that students will be able to address individual problems each of which draw upon knowledge and/or skills from **one MCA** (NS, MS or HD). **Context** should be familiar to all students and easily described.

²A **straightforward problem** requires students to either work through one step or process **or to work through more than one connected step or process**. Individual problems are based on the knowledge and/or skills in the MCA (i.e. NS, MS or HD). At Level 1 it is expected that the student will be able to address individual problems, some of which **draw upon a combination of any two of the MCA** and require students to make connections between those content areas. **The context** of individual problems at L1 will require some comprehension in order for the student to be able independently to identify and carry out an appropriate mathematical approach.

³A **complex problem** requires a **multi-step process, typically requiring planning and working through at least two connected steps or processes**. Individual problems are based on a combination of the knowledge and/or skills from the MCA (NS, MS or HD). At Level 2 it is expected that the student will be able to address individual problems some of which draw upon a combination of **all three MCA** and require students to make connections between those content areas. **The context** of individual problems at L2 will require interpretation and analysis in order for the student to be able independently to identify and carry out an appropriate mathematical process or processes.

Solving mathematical problems, carrying out tasks and decision making (PS)				
Entry 1 students are expected to be able to:	Entry 2 students are expected to be able to:	Entry 3 students are expected to be able to:	Level 1 students are expected to be able to:	Level 2 students are expected to be able to:
Use the content knowledge and skills to recognise a ¹ simple problem and obtain a solution			Use the content knowledge and skills to recognise and obtain a solution or solutions to a: ² straightforward problem. ³ complex problem.	
E1a. Use given mathematical information and recognise and use simple mathematical terms appropriate to E1	E2a. E3a. Use given mathematical information including numbers, symbols, simple diagrams and charts		L1a. L2a. Read, understand and use mathematical information and mathematical terms used at this level	
	E2b. Recognise, understand and use simple mathematical terms appropriate to Entry Level 2	E3b. Recognise, understand and use simple mathematical terms appropriate to Entry Level 3	L1b. L2b. Address individual problems as described above	
E1b. E2c. E3c. Use the methods given above to produce, check and present results that make sense [<i>E3 only</i> : to an appropriate level of accuracy]. ✓			L1c. L2c. Use knowledge and understanding to a required level of accuracy	
E1c. Provide a simple explanation for those results.	E2d. Present appropriate explanations using numbers, measures, simple diagrams, simple charts and symbols appropriate to Entry Level 2.	E3d. Present results with appropriate explanation using numbers, measures, simple diagrams, charts and symbols appropriate to Entry Level 3.	L2d. Identify suitable operations and calculations to generate results	
			L1d. L2e. Analyse and interpret answers in the context of the original problem	
			L1e. L2f. Check the sense, and reasonableness, of answers ✓	
			L1f. Present results with appropriate explanation and interpretation demonstrating simple reasoning to support the process & show consistency with the evidence presented	L2g. Present results and explain results clearly and accurately demonstrating reasoning to support the process and show consistency with the evidence presented

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