Pearson Edexcel

Exemplification

Functional Skills
Mathematics
Level 1 & 2

First registration September 2019

PEUK B00125

Functional Skills Mathematics Level 1 and Level 2 Specification (2019) Exemplification

Functional Skills questions are more likely to be set in a suitable context.

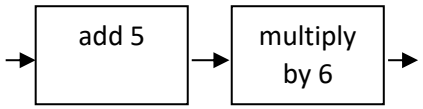
Any of the non-calculator examples could be found as part of a problem on Section B (calculator allowed) of the paper.
For **level 1**, learners should know how to use a calculator to:

- calculator the squares of one-digit and two-digit numbers
- add and subtract positive and negative numbers in context
- follow the order of precedence of operators
- convert a fraction to a decimal or percentage.

Use of number and the number system: students at **level 1** are expected to be able to count in steps of various sizes, including negative numbers; read, write and understand positive whole numbers to one million. They can order and compare whole numbers of any size, and fractions, ratios and decimals and recognise the effect of multiplying and dividing by powers of 10, 100 and 1000. They can identify, compare and extend a range of numerical and spatial patterns, use, understand and calculate with fractions, decimals and percentages and calculate simple interest.

Content reference	Typically non-calculator (Section A)	Typically calculator (Section B)	Comment
Level 1 - using numbers and the number system			
1. Read, write, order and compare large numbers (up to one million)	Write eight hundred and twenty thousand in figures. Put these numbers in order 80305 85030 80350 83005		This can be tested in either non calculator section A or calculator section B. Knowledge of greater than and less than symbol may be required.

	What is the value of the 4 in 34238? Work out 83680 – 4855		
2. Recognise and use positive and negative numbers	What temperature is 10°C lower than 4° C? Work out −3 − 8		
3. Multiply and divide whole numbers and decimals by 10, 100, 1000	Work out 38 ÷ 10 Calculate 100 × 0.235 Find the cost of 1 item if 100 items cost £80 The weight of 1 cm3 of oil is 0.85 grams. Find the weight of 1000 cm^3 of oil.		May be tested as part of a problem in combination with other subject content.
4. Use multiplication facts and make connections with division facts	Given that 34 × 18 = 612 find 612 ÷ 18 37 students in Year 8 walk to school. This is a fifth of all Year 8 students. Work out how many students are in Year 8.		

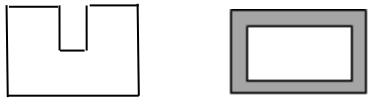
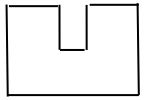
5. Use simple formulae expressed in words for one or two-step operations		Use this rule to convert a temperature of 68 °F to a temperature in °C 'Subtract 32 and then divide your answer by 1.8'	Find output given input Find input given output
6. Calculate the squares of one-digit and two-digit numbers	Work out 8^2 Calculate 13^2 Find the area of a square with a side of length 15 m	Work out $\frac{7+15^2}{20}$	
7. Follow the order of precedence of operators	Work out $3 + 4 \times 5$ Work out $(3 + 4) \times 5$	Work out $\frac{(7+11)\times 3}{(9-1)\times 5}$	
8. Read, write, order and compare common fractions and mixed numbers	Which is bigger $\frac{1}{3}$ or $\frac{1}{4}$? Write these fractions in order of size $1\frac{2}{3}$, $\frac{3}{4}$, $2\frac{3}{5}$, $\frac{5}{8}$		Non unitary fractions may be used.
9. Find fractions of whole number quantities or measurements	Find $\frac{1}{3}$ of 72 Find $\frac{2}{3}$ of 180 cm	68 out of 192 people said they had two jobs. Is this more or less than $\frac{1}{3}$ of the people?	On occasion fractions may be given in words.

10. Read, write, order and compare decimals up to three decimal places	Put these numbers in order 0.3, 0.302, 0.319, 0.28		Usually specify starting with the smallest.
11. Add, subtract, multiply and divide decimals up to two decimal places	Work out 0.2 + 0.17 Find 0.20 ÷ 5 Find 0.15 × 3	Jim is buying juice for a party. Each bottle costs £1.49 How many bottles can he buy for £20?	
12. Approximate by rounding to a whole number or to one or two decimal places	Write 12.82 correct to 1 decimal place Write 419.1794 correct to 2 decimal places		
13. Read, write, order and compare percentages in whole numbers			Any comparison may be seen at the end of a problem.
14. Calculate percentages of quantities, calculate simple percentage increases and decreases by 5% and multiples thereof	20% of £30 The price of a car was £8500 The price increased by 5% What was the price of the car after the increase?	Jim's hourly rate was £8.50 for a 38 hour week. He gets a 5% increase in his hourly rate. How much in total will he earn for a 38 hour week at this new rate?	
15. Estimate answers to calculations using fractions and decimals	5.8 x 0.299 is about 6 × 0.3 = 1.8		
16. Recognise and calculate equivalences between common fractions, percentages and decimals	Write $\frac{8}{24}$ as a fraction in its simplest form	Recognise $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{1}{10}$ and their multiples e.g. $\frac{3}{5}$ with	Learners may need to be able to use a calculator to convert fractions to decimals and to percentages.

		their decimal and percentage equivalents. Is 10 out of 60 more than 15%?	
17. Work with simple ratio 1: n with n required	Jim and Bob share some money in the ratio 1 : 3 Jim gets £16 How much does Bob get?		
Work with simple ratio 1: n with n+1 required	Some money is shared in the ratio 1 : 3 The smaller amount is £25 How much money was shared out?	Ali mixes sand with peat in the ratio 1 : 4 to make potting mixture for plants. He has 250 litres of peat. How many litres of potting mixture can he make?	
Work with a simple ratio is words	Instruction, for every 2 cups of rice use 3 cups of water. Sam uses 6 cups of rice, how many cups of water doe she need?		
Work with direct proportion	Jenny is knitting squares for charity. For every red square she also knits 4 blue squares. If she knits 7 red squares how many blue squares does she knit?	Serena knows that 5 cartons of juice are enough for 30 people. She has 8 cartons of juice. Is this enough for 45 people? The cost of a bottle of apple juice is £1.95 Work out the cost of 12 bottles.	

Use of common measures, shape and space: students at **level 1** are expected to be able to work out simple relationships between common units of measurement to define quantities, also involving mathematical terms for position and direction. They can apply and use calculations with common measures including money, time, length, weight and capacity. They can visualise, draw and describe 2-D and 3-D shapes and use properties of 2-D shapes in calculations.

Level 1 - using common measures, shape and space			
18. Calculate simple interest in multiples of 5% on amounts of money	Find the simple interest on £3000 invested for 1 year at 5%	Find the simple interest on £3000 invested for 6 years at 5%.	Use of Premium × Rate ÷ 100 × number of years where 'Premium' is the original investment.
19. Calculate discounts in multiples of 5% on amounts of money		A dress has a normal price of £29.99 A shop gives a discount of 15%. How much money is the discount?	
20. Convert between units of length, weight, capacity, money in the same system	Change 6 m to cm Change 3.6 kg to gm		1000 cm^3 = 1 litre will be given Final money answers which are in pounds and pence must be given to 2 decimal places.
Convert between units of time, in the same system	A film starts at 12:40. It lasts for 1 hr 45 min. What time does the film end? In a race of 4 laps, Jim took 4 minutes 10 seconds. His times in seconds for the first 3 laps were 59, 68 and 67 Find his time for the last lap.		Times will be displayed in a range of functional formats.

21. Recognise and make use of simple scales on maps and drawings	1 cm represents 10 metres.	Find true lengths given lengths on a scale diagram and a scale. The length of one square on the grid = 0.5 m	Maps are assumed to be drawn to scale otherwise stated. Scale drawings will also be accurately drawn and may be referenced as accurate scale drawings. Ratios will **not** be used to represent a scale at level 1
22. Calculate the area of simple shapes including those that are made up of a combination of rectangles	Work out the area of a rectangle 6 m by 7.5 m	e.g. How many square tiles 30 cm by 30 cm will be needed to cover a floor of a given or calculated area?	 Examples of composite shapes. Area by addition or by subtraction.
Calculate the perimeter of simple shapes including those that are made up of a combination of rectangles		How many fencing panels each of length 40 cm will be needed to go round a given shape?	 Diagrams may include missing lengths or gaps.
23. Calculate the volumes of cubes and cuboids	Know how to multiply three numbers together e.g. 4 x 3 x 8	Know the formula for the volume of a cuboid (and hence a cube). Given the volume and other suitable information find a length.	Units may be given or asked for.

24. Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles	Draw all the lines of symmetry on a given shape. Draw a circle with a given or calculated radius.	Given a partial shape and a line of symmetry complete the shape. Know 'acute' 'obtuse' 'reflex' 'right angle'	Shapes may include triangle, rectangle, square, pentagon, trapezium, parallelogram, hexagon, octagon, circle and any given partial shape.
25. Interpret plans, elevations and nets of simple 3-D shapes	Match given nets to common 3-D shapes. Work out the actual measurements of a box from given net and scale.		e.g. cuboids, regular prisms, pyramids Identify opposite sides on a net. Drawing a net will be of a cube or cuboid. Other common shapes may also be interpreted.
26. Use angles when describing position and direction, and measure angles in degrees	State bearings from a diagram where an angle is given. Measure angles and find bearings.		Know that angles around a point = 360^{o} Know that a right angle = 90^{o}

Handle information and data: students at **level 1** are expected to be able to select, construct and interpret a range of statistical diagrams in various contexts; select and use methods and forms to present and describe outcomes. They can extract and interpret information from tables, diagrams, charts and graphs; apply simple statistics and recognise features of charts to summarise and compare sets of data; recognise and use the probability scale and interpret probabilities.

Level 1 - handling information and data			
27. Represent discrete data in tables, diagrams and charts including bar charts and line graphs			Learners may be given a scale or required to decide on and use a sensible scale for axes.
Represent discrete data in tables, diagrams and charts including pie charts			Learners may be required to work out the size of angles of sectors in a pie chart.
28. Group discrete data and represent grouped data graphically	Equal size intervals for numerical data. According to some quality (e.g. colour)		Use of tally column and frequency column.
29. Find the mean of a set of quantities	Find the mean of a set of data.	There are 12 workers in a cooperative. Their mean wage is £355 What is the total wage bill for the 12 workers?	
Find the range of a set of quantities	Find the range of a set of data.		Use of Highest value = range + lowest value

30. Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities to compare the likelihood of events	Locate probabilities on a probability line.		Link positions on the line with likelihood e.g. halfway along is even chance.
31. Use equally likely outcomes to find the probabilities of simple events and express them as fractions	e.g. There are 8 counters in a bag. 4 are red, 3 are green and 1 is blue. What is the probability of selecting a green counter at random?		Be able to place events on a probability line where the probabilities are fractions.

Functional skills questions are more likely to be set in a suitable context.

Any of the non-calculator examples could be found as part of a problem on section B (calculator allowed) of the paper.
For **level 2,** learners should know how to use a calculator to:

- calculate the squares of one-digit and two-digit numbers
- add and subtract positive and negative numbers in context
- follow the order of precedence of operators
- convert a fraction to a decimal or percentage.

Use of numbers and the number system: students at **Level 2** are expected to be able to use numbers of any size; read, write and make use of positive and negative integers of any size; use, order and compare integers, fractions, decimals, percentages and ratios as well as recognise the value of a digit in any whole or decimal number. They can use numerical and spatial patterns for a purpose and calculate with, and convert between, numbers written as fractions, decimals, percentages and ratios.

Content reference	Typically non-calculator (Section A)	Typically calculator (Section B)	Comment
Level 2 - using numbers and the number system			
1. Read, write, order and compare positive and negative numbers of any size	Write 10.6 million in figures. Put these temperatures in order. Start with the coldest. −8°C 7°C −4°C −5°C 0°C		Pearson Edexcel does not use commas for large numbers but spaces. Use of commas by students will not be penalised.
2. Carry out calculations with numbers up to one million	Work out 27 × 63 Work out 1718 ÷ 6 Work out the cost of 16 items, each costing £19.99		

..... including strategies to check answers including estimation and approximation	Check the answer to 206 × 305 by using approximations. Use suitable approximations to estimate the answer to 980 ÷ 19.8	Check that the total cost of 15 items at £14.49 each is £217.35 by showing £217.35 divided by 15 with an answer e.g. 217.35 ÷ 15= 14.49	Sensible reading of calculator display.
3. Evaluate expressions and make substitutions in given formulae in words and symbols	$y = at^2$ a = 5, t = 10 Work out the value of y		At level 2, formulae will often be in algebra but can be in words.
4. Identify and know the equivalence between fractions, decimals and percentages	$\frac{3}{4} = \frac{6}{8}$ $1\frac{1}{2} = \frac{3}{2}$ Know e.g. 0.9 = $\frac{9}{10}$ = 90% Know e.g. 3% = 0.03 = $\frac{3}{100}$ Use $\frac{2}{5}$ = 0.4 = 40%	23 out of 89 men like a brand of scent. 52 out of 190 women like the scent. Which group like the scent the most? Use a calculator to change $\frac{7}{20}$ to a decimal or to a percentage.	$\frac{1}{3}$ = 30% = 0.3 is **not** acceptable.
5. Work out percentages of amounts	Find 17% of 200 metres. Find 12% of 80 kg.	Find 12.5% of 170 cm. Give your answer correct to the nearest cm.	VAT at the time of writing will be used and the rate stated.
..... express one amount as a percentage of another	Express 12 as a percentage of 200 Express 30 cm as a percentage of 3 metre.	Rahul spends £28 a week on bus fares. He earns £350 a week. What percentage of his earnings does he spend on bus fares?	

6. Calculate percentage change (any size increase and decrease)	The workforce was 200 people. After a year, the workforce had increased to 212 Work out the percentage increase.	The workforce was 180 people. After a year, the workforce had increased to 214 Work out the percentage increase correct to 1 decimal place. The height of a plant was 40 cm. The height increased by 13%. Find the new height of the plant.	See also 13.3
Calculate original value after percentage change	The garage sold 5% more cars this year than last year. This represents 30 cars. How many cars were sold last year? The cost of an item is to be increased by 20%. What do we need to do to the old cost to get the new cost? × 0.2 × 1.2 ÷ 0.2 ÷ 1.2	The original number of people claiming benefits at a centre increased by 25%. The number now is 120 What was the original number?	

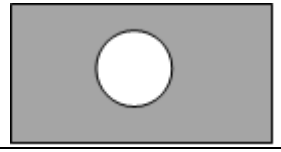
7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers	$\frac{3}{4}-\frac{5}{8}$ $\frac{2}{3}+\frac{5}{6}$ Which is larger $\frac{2}{3}$ of 24 m or $\frac{3}{4}$ of 20 m? Which is larger $\frac{2}{5}$ or $\frac{3}{8}$?	Work out $4\frac{1}{3}+3\frac{5}{8}$ Give your answer as a mixed number.	Use of fraction key on a calculator.
8. Express one number as a fraction of another	Express 20 cm as a fraction of 3 m. Then give the fraction in its simplest form.		
9. Order, approximate and compare decimals	Put these numbers in order. Start with the smallest. 0.038 0.05 0.48 0.007 Write 0.28371 correct to 2 decimal places. Read calculator displays and round correct to 2 decimal places.		
10. Add, subtract, multiply and divide decimals up to three decimal places	Work out 0.25 + 0.357 Work out 2 – 0.47	How many strips of wood each 0.15 m long can be cut from a 4 m strip?	

Multiply and divide decimals up to three decimal places	0.4 × 0.21 0. 808 ÷ 0.2		
11. Understand and calculate using ratios a : b	Share £30 in the ratio 2 : 3		Also ratios of the form a : b : c
Understand and calculate using ratios 1 : n, n + 1 required	Some money is shared in the ratio 1: 3 The larger amount is £75. How much money was shared out?		
Understand and calculate using direct proportion and inverse proportion	Recipes Tiling Paint coverage	8 bottles of water hold 6 litres. How much water can 11 bottles hold? 640 g of meat cost £4 Work out the cost of 900 g of meat. 2 pumps take 3 hours to empty a pool. How long will 3 pumps take to empty the pool?	Scaling up recipes
12. Follow the order of precedence of operators, including indices	Work out 10×3^2 Use of Bidmas in evaluating algebraic expressions	3.2×2.5^4	

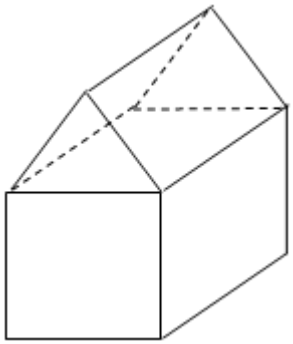
Use of measures, shape and space: students at **level 2** are expected to be able to handle relationships between measurements of various kinds, use angles and coordinates when involving position and direction and make use of geometric properties in calculations with 2-D and 3-D shapes and understand the relationships between them.

Level 2 - using common measures, shape and space			
13. Calculate amounts of money, including tax and simple budgeting	Bill earns £20 000 a year. He does not pay income tax on the first £12 500 He pays tax at 20p in the £ on the remainder. How much tax does he pay?	£1 = $1.32 Change £550 to $ Change $300 to £	
Calculate compound interest		£6000 is invested at 1.5% for 3 years. Calculate the final amount.	Compound interest – for more than 3 years the formula $I = P\left(1 + \frac{r}{100}\right)^n$ would be useful to know.
Calculate percentage increases, decreases and discounts	The price of a weekly train return ticket is £40 The price increases by 4%. Find the new price.	A car dealer offers a discount of 7.5% of the normal price of a car for cash. The normal price of a car is £12 800 Work out the discounted price.	

14. Convert between metric and imperial units of length, weight and capacity using a conversion factor	Change 6.5 gallons to litres Change 1000 litres to gallons		e.g. 1 inch = 2.54 cm 1 mile = 1.6 km 1 mph = 1.6 kph 1 kg = 2.2 pounds 1 gallon = 4.5 litres Any imperial/metric conversion will be given.
Convert between metric and imperial units of length, weight and capacity using a conversion graph			Graph may have to be drawn by learner first Reading off and solving simple problems
15. Calculate using compound measures ..... speed		The speed of a car is 50 mph. How far does it travel in 36 minutes?	S = D/T, D = S × T, T = D/S Know that 60 mph means it takes 1 minute to go 1 mile
Calculate using compound measures ..... density (formula will be given)		The density of wood is 1.2 grams/cm^3 Work out the mass of a cuboid 6 cm by 8 cm by 10 cm	Density = $\frac{\text{Mass}}{\text{Volume}}$ will be given Problems which require mass given density and volume or which require volume given mass and density may be set.

Calculate using compound measures ....rates of pay **NB Other compound measures may be set**	Basic rate = £12 per hour Overtime rate = 'time and a third'	Gemma gets £467.40 for a 38 hour week. Work out her hourly rate of pay.	Need to know 'double time', 'time and a half' etc
16. Calculate perimeters and areas of 2-D shapes including triangles and circles	Find the circumference of a circle with diameter 5 cm	The circumference of a circle is 20 cm. Find its radius correct to 2 decimal places.	Knowledge of Pythagoras will not be needed. $C = \pi \times D$ and $D = 2R$ must be known. $\pi = 3.14$ is given in the general instructions at the start of the paper.
Calculate areas of 2-D shapes including composite shapes including non-rectangular shapes (formulae given except for triangles and circles)		A grass lawn is rectangular 12m by 15 m. There is a circular flower bed of radius 2m in the lawn. Work out the area of the grass 	$A = ½ \times B \times H$ $A = \pi \times R^2$

Calculate perimeters and areas of 2-D shapes including composite shapes including non-rectangular shapes (formulae given except for triangles and circles)			Area and perimeter of semi circles and quadrants
17. Use formulae to find volumes of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)	A square based pyramid has a height of 10 cm. The length of one side of the base is 6 cm. Use the formula V = 1/3 area of base × height to work out the volume of the pyramid		Formulae for volume of cubes and cuboids must be known as it is a Level 1 requirement. $V = \pi \times R^2 \times H$
Use formulae to find surface area of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)		A closed storage can is in the shape of a cylinder with a radius of 40 cm and height 60 cm. The surface is to be coated, Work out the area to be coated.	Surface area of cuboid/cube can be worked out from first principles. Curved surface area = C × H or π × D × H or 2 πRH Area of flat ends = $2\pi R^2$
18. Calculate actual dimensions from scale drawings			Use of ratio scales 1 : 200 means for every 1 cm on the map, 200 cm in reality. Student may need to complete the key.
…… and create a scale diagram given actual measurements			

19. Use coordinates in 2-D, positive and negative, to specify the positions of points	Mark the point (3, −5) on the grid. What are the coordinates of a point *P* shown on a grid?		
20. Understand and use common 2-D representations of 3-D objects			Extract measurements from a diagram of a 3-D shape. Understand a plan and an elevation of a 3-D shape. Use of a net.
21. Draw 3-D shapes to include plans and elevations		Draw a net of a triangular prism.	Given a diagram of a 3-D shape, draw accurate plans/elevations. Use isometric paper to draw simple shapes. Direction of plan etc will be shown by an arrow.
22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes		 Given the pitch of the roof(s) what is the angle at the top?	3 letter notations may be used for an angle. Where clear, angles will be marked on a diagram. Know Sum of angles in a triangle = 180^0 Sum of angles on a straight line = 180^o Sum of angles in a quadrilateral is 360^o Vertically opposite angles are equal. Knowledge about properties of triangles would be beneficial.

Handle information and data: students at **level 2** are expected to be able to construct, interpret and evaluate a range of statistical diagrams. They can calculate and interpret probabilities. They can calculate, analyse, compare and interpret appropriate data sets, tables, diagrams and statistical measures such as common averages (mean, median, mode) and spread (range), and use statistics to compare sets of data. They can identify patterns and trends from data as well as recognise simple correlation.

<table>
<tr><th colspan="4">Level 2 - handling information and data</th></tr>
<tr><td>23. Calculate the median of a set of quantities</td><td></td><td></td><td>May be given as an initially unordered list</td></tr>
<tr><td>Calculate the mode of a set of quantities</td><td></td><td></td><td>May be given as an initially unordered list or in a frequency table or in a chart.</td></tr>
<tr><td>24. Estimate the mean of a grouped frequency distribution from discrete data</td><td></td><td><table><tr><th>Size of shoe</th><th>Frequency</th></tr><tr><td>1 - 3</td><td>6</td></tr><tr><td>4 - 6</td><td>8</td></tr><tr><td>7 - 9</td><td>4</td></tr><tr><td>10 - 12</td><td>2</td></tr></table>
Work out an estimate of the mean size of a shoe.</td><td>'Estimate' implies use of midpoints of class intervals.

Also questions in a frequency table for single values may be set.</td></tr>
<tr><td>25. Use the mean, median, mode and range to compare two sets of data</td><td>The mean wage of workforce A is £300 with a range of £50
The mean wage of workforce B is £320 with range of £24
Compare the two workforces.</td><td></td><td>Learners may be required to give an answer in context.
Mean etc implies 'average or typical values'.
Range implies 'spread of values'.</td></tr>
<tr><td>26. Work out the probability of combined events .....</td><td></td><td></td><td>Mutually exclusive – 'Or' implies add Independent – 'And' implies multiply</td></tr>
</table>

Work out the probability of combined events including the use of diagrams and tables, including two-way tables	The probability the work will take 4 days is 0.95 Work out the probability the work will not be done in 4 days.		Probability tree diagrams may be set. The probability a given occurrence happening is 1 – the probability that occurrence does not happen.
27. Express probabilities as fractions			Reference level 1 statement.
Express probabilities as decimals and percentages			When two fair coins are thrown the probability of 2 heads is 0.25 or 25%
28. Draw scatter diagrams and recognise positive and negative correlation	Plot a point on a scatter diagram. Draw a scatter diagram given information.		See 19
.....interpret scatter diagrams and	Draw a line of best fit on a given scatter diagram		Draw a line of best fit. Use the line of best fit to estimate values from the scatter diagram.
interpret scatter diagrams and recognise positive and negative correlation			Know that positive correlation implies that as one variable increases then so does the other. Know that negative correlation implies that as one variable increases the other decreases.