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20 GCSE Foundation/Higher Functional and 'Wordy' Questions.

Aimed at pupils looking to secure C grades or higher on both Foundation and Higher papers.

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(1) Paul calculates the **sum** of the numbers from 1-5. He then calculates the **product** of the numbers from 1-5.

(a) Write down what the words *sum* and *product* mean (1)

(b) Find the difference between the sum of the numbers from 1-5 and the product of the numbers from 1-5 (3)

(c) Paul says the difference between the sum and the product of the numbers 1-5 is more than 10% of 1100. Is he correct? You must explain your answer showing your workings. (2)

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(2) Fred wants to carpet his kitchen with carpet tiles. A plan of the kitchen floor is shown below with the measurements given in meters.

7.5m

15m

The carpet tiles Fred wants to buy are square shaped and have side lengths 75cm.

(a) Show that Fred will not have to cut any of the tiles and state how many tiles he will need to cover the kitchen floor fully.   (3)

Carpet tiles cost £2 each. A discount of 20% is offered to customers who buy 250 or more tiles.

(b) Would you advise Fred to buy exactly the correct amount of tiles he needs (The number found in your answer to part (a)) or to buy 250 tiles?
You must explain your answer fully showing calculations.   (5)

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(3) There are 200 pupils in year 11 at Smallville High School.

$\frac{1}{4}$ of the pupils in year 11 have blonde hair.

$\frac{1}{8}$ of the pupils in year 11 have black hair.

(a) How many pupils in year 11 at Smallville High School have neither blonde hair nor black hair? (3)

(b) What fraction of the total number of pupils in year 11 at Smallville High School has neither blonde hair nor black hair? Give your answer in its simplest form. (2)

There are 250 pupils in year 10 at Smallville High School.
30% of the pupils in year 10 have blonde hair.

(c) How many more pupils are there in year 10 with blonde hair than in year 11? (2)

(d) Explain why exactly 25% of pupils in year 10 can't have blonde hair. (3)

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(4) Sue reads her gas meter at the start of February and again at the end of May. The readings are shown below

Date	Units Used
1st February	1837
31st May	2012

Sue receives her gas bill for the period from the start of February to the end of May.
The first 150 units are charged at 31p per unit **exclusive** of VAT.
Any more units used over 150 are charged at 12p per unit **exclusive** of VAT.

(a) Calculate Sue's bill for the period from the start of February to the end of May exclusive of VAT. (4)

VAT is charged at 20% and is added to the bill. Sue has budgeted £60 to pay the gas bill **inclusive** of VAT.

(b) Will Sue be able to afford to pay the gas bill with the £60 she has saved? You must show your workings. (3)

(5) Bob, Bill and Ben are triplets. They decide to paint their bedroom in the school holidays. The triplets can all paint at the same speed.
Bob says he can paint the room in 4 and a half hours.

(a) How many minutes will it take to paint the room if all 3 triplets work together? (2)

The total area of the wall space that needs painting is $96m^2$. The paint the triplets buy costs £3.60 per tin and each tin covers $9m^2$.

(b) Calculate the total cost of painting the bedroom ignoring any waste. (3)

The triplet's friend Fred says he can get the job done in 3 hours. Fred offers to paint the room for £14 per hour which includes the cost of the paint he will use. The triplets want to spend as little money as possible.

(c) Should they hire Fred or do the job themselves? You must explain your answer clearly showing your workings (3)
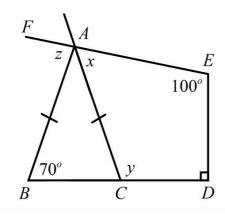
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(6) Jesse is baking some cakes. The ratio of flour to sugar to butter to powdered milk is 4:3:2:2. All of the ingredients are measured in grams.
Jesse uses 150g of sugar in the first batch of cakes she makes.

(a) How much flour does she use in the first batch? (2)

(b) Jesse makes a second batch of 12 cakes and uses 180g of sugar. How much butter will she need to make 6 cakes? (3)

Jesse realises the cakes need more sugar and increases the ratio to 4:5:2:2 when she makes her third batch of cakes.
The total weight of the mixture of the third batch is 520g

(c) How much butter did Jesse use in the third batch? (3)

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(7) Rob has drawn a design for a solid rectangular box with a lid to store his books in. The dimensions of the box are $3m$, $2m$ and xm.

(a) Sketch **one possible** plan view of the box in the space below (2)

The dimensions of the top of the box are actually $3m$ by xm.
Given the surface area of the top of the box is $12m^2$

(b) Find the value of x (2)

(c) Find the total surface area of the box (3)

(d) Show that the numeric value of the volume of the box is less than the surface area of the box (3)

Rob is going to build the box from panels of wood. A $4m$ by $3m$ panel cost £4.
A $4m$ by $2m$ panel costs £3 and a $3m$ by $2m$ cost £2.
He will also need two tubs of glue which cost £1.20 each.

(e) Find the total cost of making the box (4)

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(8) Annie, Betty and Carry are revising for their maths exam one afternoon.
It takes Annie 4 minutes to complete each question.
It takes Betty 8 minutes to complete each question.
It takes Carry 6 minutes to complete each question.
The girls are each given a practice book with 100 questions in and they start working through the questions. They all start their books at exactly 2pm.

(a) Carry has just finished her 4th question. How many questions has Betty completed at this time?   (2)

(b) Show that Annie will finish the 100 questions before 9pm if she works continuously through the book.   (3)

(c) At a certain point during the afternoon all 3 girls finished a question at the same time. Give one possible time when this could have happened.   (2)

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(9) It takes 6 men 48 days to build a bridge. Each man is paid £120 wages per day for their work.

(a) How long would it take 8 men to build the same bridge if they work at the same rate as the 6 men? (2)

(b) Find the total cost of wages if the 6 men were to complete the job (2)

The project manager decides to use 6 men to build the bridge.

$\frac{1}{6}$ of the total time of the project is spent on brickwork and 25% of the total project time is spent on metalwork. The remaining time is spent on painting the bridge.

(c) How many days are spent painting the bridge? (3)

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(10)

(a) Both boys are girls attend Sunnyville High School. One third of the students at the school are boys. 25% of the boys in the school like football. Given that there are 14 boys in the school who like football work out the number of girls in the school.
You must make your workings clear. (3)

(b) In a different high school the ratio of boys to girls is 3:7. There are 210 girls at the school. How many children are there at the school? (3)

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(11)* The diagram below shows the isosceles triangle *ABC* and the quadrilateral *ACDE* . *BCD* and *FAE* are straight lines. Find the size of angles *x* , *y* and *z* stating clearly your reason for the size of each angle.   (5)

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(12) John says $2^3 = 6$. Jill says he is wrong.

(a) Explain why Jill is right giving the correct answer and write down the mistake you think John has made (2)

Jill says squaring any number will increase its value.

(b) Show she is wrong with a number between 0 and 1. (2)

John thinks of a number and squares it. His answer is 25. Jill says his number was 5.

(c) Explain why she **may** be wrong (2)

Jill thinks of a number. She squares it and writes the number down. She starts again and cubes her original number. The answer is the same each time.

(d) Write down a possible number Jill is thinking about. (2)

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(13) A square has an area of $25m^2$

(a) Find the perimeter of the square giving your answer in cm.   (3)

(b) Find the difference between length of the diagonals and the length of the sides of the square giving your answer in meters to one decimal place.   (3)

(c) Draw a sketch of: (4)
(i) a triangle with the same area as the square clearly stating its dimensions
(ii) a kite with the same area as the square clearly stating its dimensions

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(c)

(14) Helen needs to average 76 marks out of 100 in 5 different subject papers to pass her school exams. She has an average of 74 after 4 subject papers.

(a) What score does she need to get in the final paper to pass her school exams? (3)

(b) 26% of students sitting the exams pass. There are 300 students in Helens school. How many of them will pass the exam? (2)

(c) There are 50 questions on the paper and Helen takes on average 15 seconds to answer each question. She also needs 15 minutes at the end of the exam to check her workings.
Students get 30 minutes to complete the 50 questions and the exam starts at 12pm.
Show that she will finish the exam in time and state the time at which she will finish. (3)

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(15)

(a) Show that $\sqrt{72}$ will be between 8 and 9   (2)

(b) Which value will the answer be closer to?   (1)

(c) Write down an estimate for $\sqrt{96}$ (2)

(d) The square below has an area of $27cm^2$ and side length x . Write down an estimate for the value of x giving your answer in meters.   (3)

$$Area = 27cm^2$$

x

(16)* Jean works in a shop. She is paid £7.20 an hour during the week and £9.60 an hour at weekends. Jean can get a lift with her mum to work during the week but has to go on the bus if she wants to work weekends. A return bus ticket costs £3.80 per day at weekends.

Jean has the choice of working 5 hours a day on Monday to Thursday **or** a total of 16 hours on the weekend over 2 days.

Show that Jean will take home more money if she works at the weekend. (5)

(17) A car depreciates at a rate of 10% per year.
The car costs £20000 new.

(a) Explain why the car won't be worth £16000 after 2 years. (2)

(b) Show that the car will be worth £16200 after 2 years and find the value of the car after 3 years. (4)

(c) Describe the type of correlation between the value of the car and the age of the car. (1)

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(18) The rectangle below is measured in centimetres has side lengths $2p$ and $p+3$.
The perimeter of the rectangle is $30cm$

$$2p$$

$$p+3$$

(a) Find the area of the rectangle. (4)

(b) The rectangle is a piece of wood John wants to paint. Paint costs £1.40 per tin and each tin covers $20cm^2$ of the wood. He also needs to buy 2 paint brushes at £2.35 each. Calculate the total costs of painting the piece of wood. (3)

(19) Steve is trying to make the weight for a Boxing match. Steve needs to be 72kg or less for fight night. He is currently 79kg. His trainer tells him he can lose 4lbs a week comfortably.

Given 1kg = 2.2lbs find how many weeks it will take Steve to reach his target weight of 72kg. Give your answer to the nearest week. You must show all of your workings

(4)

(20) Bob is a gardener and he wants to sell plants. He has a supply of 3 different types of seed, Seed A, B and C, stored in his shed. He has 400 type A's, 600 type B's and 2000 type C's. Bob has to decide whether to plant type A, B or C. He can only pick one.

The probability of Seed A growing into a plant is 0.3

The probability of Seed B growing into a plant is $\frac{1}{5}$

The probability of Seed C growing into a plant is 0.08

(a) Which seeds should Bob pick in order to produce the highest number of plants?

(4)

(b) Bob decides to sell the plants found in the answer to part a of the question. He sold one eighth of them at a car boot sale for £3.20 each. How much money did he make in total from selling the plants? (3)

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Q	Mark	Topics or skills I can focus on
1 (NC)	/6	
2 (NC)	/8	
3 (NC)	/10	
4 (C)	/7	
5 (C)	/8	
6 (NC)	/8	
7 (NC)	/13	
8 (NC)	/7	
9 (C)	/7	
10 (NC)	/6	
11 (NC)	/5	
12 (NC)	/8	
13 (C)	/10	
14 (C)	/8	
15 (NC)	/8	
16 (C)	/5	
17 (NC)	/7	
18 (NC)	/7	
19 (C)	/4	
20 (C)	/7	
Bonus	/1	1 bonus mark for presentation
Total	/150	

(NC) = Non Calculator Question (C) = Calculator Question

Teacher Feedback