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Final Push Maths 3

Foundation Paper Revision

NUMBER OPERATIONS: LONG MULTIPLICATION AND LONG DIVISION

1 17.834×69.7

2 14.8×0.035

3 $1951.6 \div 82$

4 $31156.4 \div 73$

VECTORS

1 $\mathbf{a} = \begin{pmatrix} 6 \\ -5 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -7 \\ 9 \end{pmatrix}$

Find the solution to $5\mathbf{a} - 7\mathbf{b}$

2 $\mathbf{a} = \begin{pmatrix} 9 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -4 \\ 9 \end{pmatrix}$

Find the solution to $3\mathbf{a} - 5\mathbf{b}$

3 $\mathbf{a} = \begin{pmatrix} 7 \\ -4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$

Find the solution to $2\mathbf{a} - 8\mathbf{b}$

BEST BUYS

- 1 Barnaby sells 11 chocolate bars for £6.71. Juliet sells 6 chocolate bars for £3.30. Who provides the best value for money?

- 2 Three taxi companies operate in a town. Their prices are as follows:

Cars n Cabs Collection £1.99 27p per mile	ABC Carriages Collection £1.0 29p per mile	Green Taxis Collection £5.00 14p per mile
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David wants to travel 17 miles.

Which company offers the cheapest price?

- 3 A bag costs £83 in a shop. Online, the same bag can be purchased for \$125 plus \$11 postage and packaging. The exchange rate is £1.00 : \$1.51. Where is the best place to buy the bag?

EXPANDING AND FACTORISING

1 Expand $6(7x + 3)$

2 Expand $7x(3x - 13)$

3 Expand and simplify $(6x - 9)(2x - 7)$

4 Factorise $15x^3 + 27x^2$

5 Factorise $40x^2 - 32x$

6 Expand and simplify $5(7x + 2) - 6(5x - 3)$

SIMULTANEOUS EQUATIONS

1 Solve for x and y.

$$6x + 5y = 107$$

$$9x - 2y = 37$$

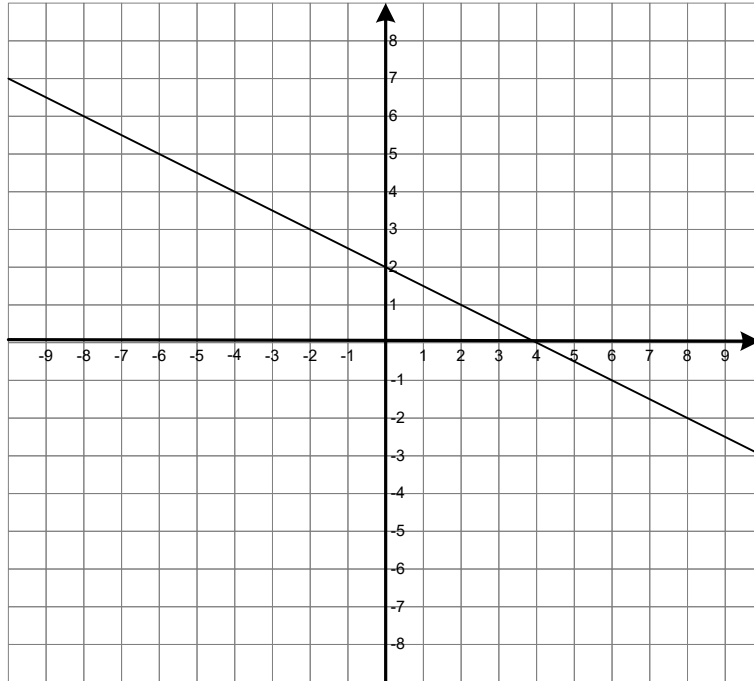
2 Solve for w and v.

$$12w + 6v = 12$$

$$8w + 12v = 72$$

GRAPHS

- 1 L is a line segment shown on the graph below.
Write down the equation for line L.

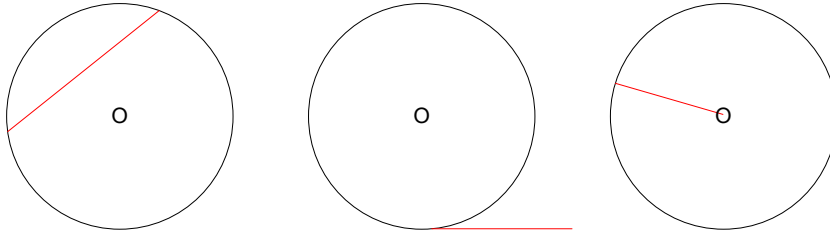


- 2 Fill the missing values into the table below for the graph $y = x^2 + 2x$ in the range $-3 \leq x \leq 3$.

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

CIRCLES

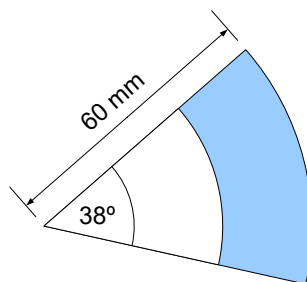
- 1 Name the lines shown on these circles in red.



- 2 The radius of a circle is 18cm. Calculate its circumference. Give an exact answer.

- 3 The diameter of a circle is 2.8cm. Calculate its area giving the answer correct to 3 significant figures. Take $\pi = 3.14$.

- 4 What is the area of the shaded section in the diagram below when the ratio of the radius of unshaded to shaded is 3:2?



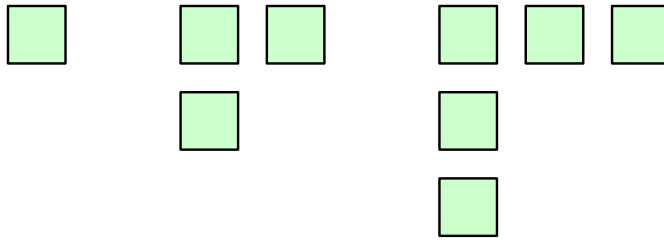
SEQUENCES

1 Below is the start of a sequence. Write the next three terms in the sequence.

1, 5, 25, 125, , ,

2 Below is a sequence.

a Draw a diagram for the **fifth** term in the sequence.



b Is this sequence linear? Explain how you know.

3 $\frac{n-8}{5}$ is the nth term for a sequence.

What is the fortieth term in the sequence?

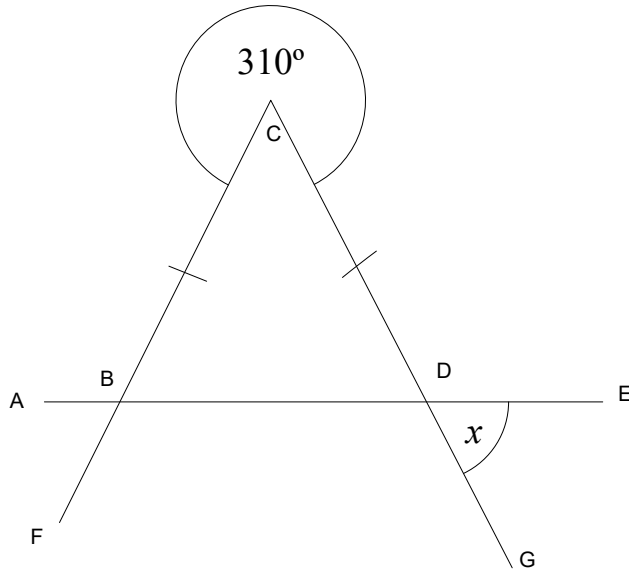
4 Below is a linear sequence.

-6, 2, 10, 18, 26

Find the nth term.

GEOMETRY

- 1 AE is a straight line.
BCD is an isosceles triangle.
Find the size of angle x. GIVE REASONS



RATIO

- 1 Bill, Mary and Jacob share 117 sweets in the ratio 6:4:3.
How many sweets does each person get?

- 2 John, Julie and Joel put some money into a pot. The ratio that they put in is 8:5:7.
Joel puts in £560. How much money is there in total?

- 3 Beatrice, Ben and Billy play a game. The ratio of scores is 23:17:9. Billy scores 88 fewer points than Ben. How many points does Beatrice score?

- 4 Write the ratios 24:42:72 as fractions in their simplest form.

- 5 Write 10:35 in the form 1:n

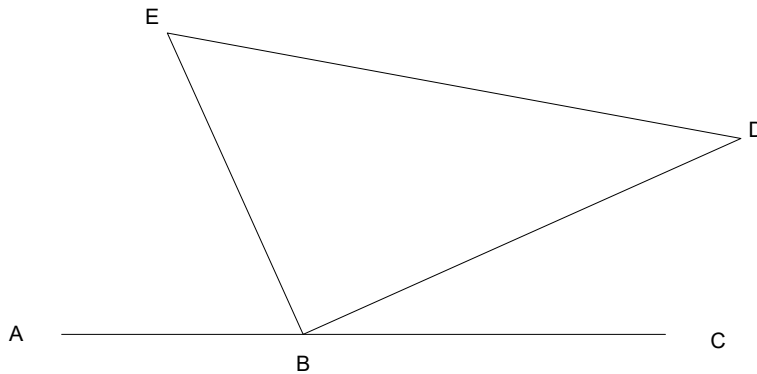
- 6 The ratio of sand to cement of a concrete mixture is 5:3. The mixture of sand to gravel is 3:7.
Lilly-May wants to make 600kg of concrete. How much sand, cement and gravel does she need?

- 7 Charlotte fills a bucket with water. She adds concentrate cleaner so that the ratio of concentrate to water is 2:15. She uses 20% of the mixture cleaning the kitchen floor. There are 2 litres of mixture left in the bucket. How much concentrate did she use?

WRITING EQUATIONS FROM PROBLEMS

Geometry: With these, it might be helpful to draw a diagram. **It is essential to write the equation.**

- 1 Angle BED is twice the size of angle EDB.
Angle EBD is 20 degrees greater than BED.
Angle ABE is three times the size of DBC.
What is the size of ABE?



Everyday problems

- 1 David thinks of a number. He trebles his number then adds ten. He divides the result by 5 and ends up with 8. What was David's original number?
- 2 Anita is twice as old as Barry. Barry is seven years younger than Charlie. The total of their ages is 65. How old is each person?
- 3 Harley is twice Lilly-Ella's age. Selina is 6 years younger than Harley. Their total age is 39. How old is each person?

TWO WAY TABLES AND PROBABILITY

A travel company ran holidays to three different destinations: South Africa, Australia and Brazil.

People could book a single room or a double room.

In a single room, the occupant paid 25% more for the room than each of the occupants in a double room.

Seventeen of the forty-nine people who booked to go to Australia needed a single room.

Altogether, there were forty people staying in double rooms in Brazil.

Nineteen people booked single occupancy in South Africa.

In total, 87 of the 183 people travelling booked a single occupant room.

a Fill in the table below.

	Australia	Brazil	South Africa	Total
Single Room Occupants				
Double Room Occupants				
Total				

- b The cost for a pair of travellers sharing a room in South Africa was £200 per night. How much money did the travel company need to collect from all the single room occupants in South Africa per night?
- c Giving your answer to two decimal places, what percentage of the single travellers stayed in Brazil?
- d The travel company took 15% profit from the total takings. Each person in double occupancy rooms paid the following for their holidays: Australia £2300, Brazil £1750 and South Africa £1800. How much profit did the company make altogether?

INDICES

1 What is the value of $27^0 \times 9$?

2 What is $m^7 \times 3m^6 \times 4m \times 5m$?

3 What is the value of $\left(\frac{4}{5}\right)^3$?

4 What is $\frac{u^9 \times u^{11}}{u \times u^8 \times u^3}$?

5 Write $\frac{9 \times 9^{11}}{9^3 \times 9^4}$ in the form 9^n where n is an integer.

6 Write $\frac{1024^3 \times 256^7 \times 16^5}{4096^{11} \times 64^{12}}$ in the form 4^n where n is an integer.

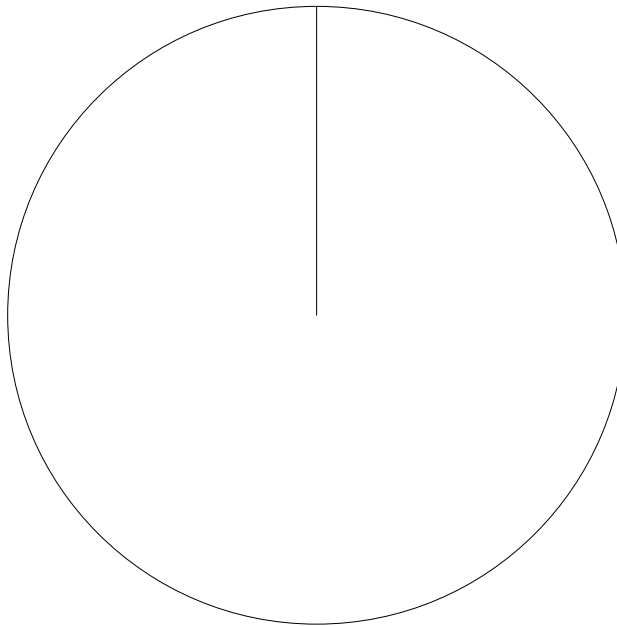
PIE CHARTS

- 1 In a school, St James' School of the Arts, students are given the options of studying French, German, Italian or Spanish.

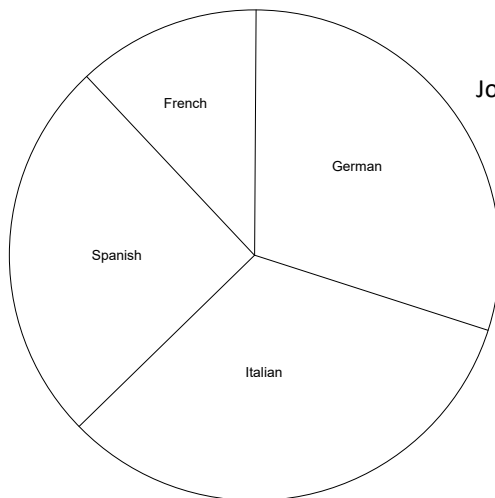
The table below shows how many students study each language.

French	35
German	23
Italian	17
Spanish	15

- a Use the circle below to draw a pie chart displaying this information.



- b What percentage of students study Spanish?
- c Another school, Rochwell Grammar School, offers the same four subjects.

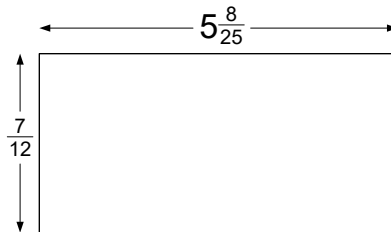


Joanne says that more people study Spanish at Rochwell Grammar School than at St James' School of the Arts.

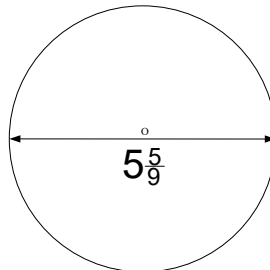
- d Is Joanne correct? Explain how you know.

FRACTIONS

- 1 Change $7\frac{9}{16}$ into an improper fraction.
- 2 Solve and simplify $\frac{15}{18} \times \frac{21}{30} =$
- 3 Solve and simplify $\frac{10}{11} \div 15 =$
- 4 Multiply $6\frac{4}{9} \times 6\frac{3}{8} =$
- 5 Solve and simplify $\frac{8}{13} + \frac{9}{26} =$
- 6 Solve and simplify $9\frac{4}{7} - 8\frac{3}{7} =$
- 7 What is the area of the rectangle below. All dimensions are given in cm.



- 8 What is the area of the circle? All dimensions given in cm.



PERCENTAGES AND DECIMALS

- 1 Write $3\frac{1}{2}\%$ as a decimal.
- 2 Write 0.004 as a percentage.
- 3 Change $\frac{7}{20}$ into a percentage.
- 4 Change $\frac{3}{8}$ into a decimal.
- 5 What is 64% of 400?
- 6 Bill, Charlie and Dave try to save money in their savings account. Bill earns £2800 a month and has a ratio of spend: savings of 3:2. Charlie earns £2600 each month and saves $\frac{7}{8}$ ths of this amount. Dave spends 68% of the £3100 that he earns each month. Who saves the most money?
- 7 A car was in a sale where you saved 40%. The sale price of the car was £12500. How much was the original price of the car?
- 8 Gabriella puts £2500 into her savings account and leaves it there for four years. Her bank account pays 4.2% compound interest per annum. How much money is in her bank account at the end of the four years?
- 9 Round 201.952 to three significant figures.
- 10 Round 162.9576 to two decimal places.

RECIPES

Charlotte loves baking. She wants to make some buns for a cake stall. She needs to make **50 buns** altogether.

Recipe for Chocolate Cupcakes with Buttercream (Serves 10)

175g unsalted butter, softened

375g caster sugar

6 medium free-range eggs

5 tbsp cocoa powder, dissolved in 3 tbsp boiling water

275g self-raising flour

280g icing sugar

3½ tbsp vanilla extract

2½ tbsp milk

Charlotte’s dad is going shopping and Charlotte has asked him to get some ingredients. She has looked and sees that she only needs butter, icing sugar, self-raising flour and cocoa powder.

How much of each ingredient does Charlotte’s dad have to buy?

Butter g

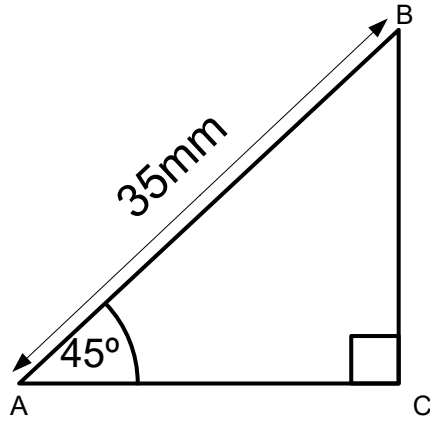
Icing sugar g

Self raising flour g

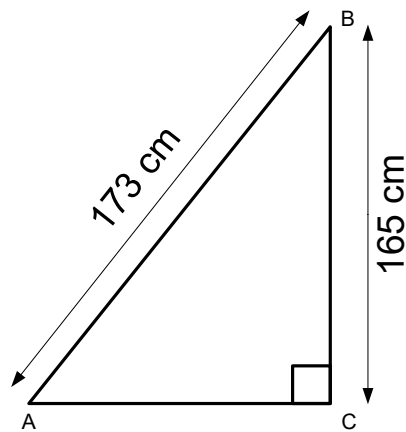
Cocoa Powdertbsp

TRIGONOMETRY AND PYTHAGORAS' THEOREM

- 1 ABC is a right-angled triangle. Find the length of the side AC.



- 2 ABC is a right angled triangle. What is the length of side AC?



FREQUENCY TABLES

In a netball competition, the organisers collect data from each hole to see if they have set the scores correctly.

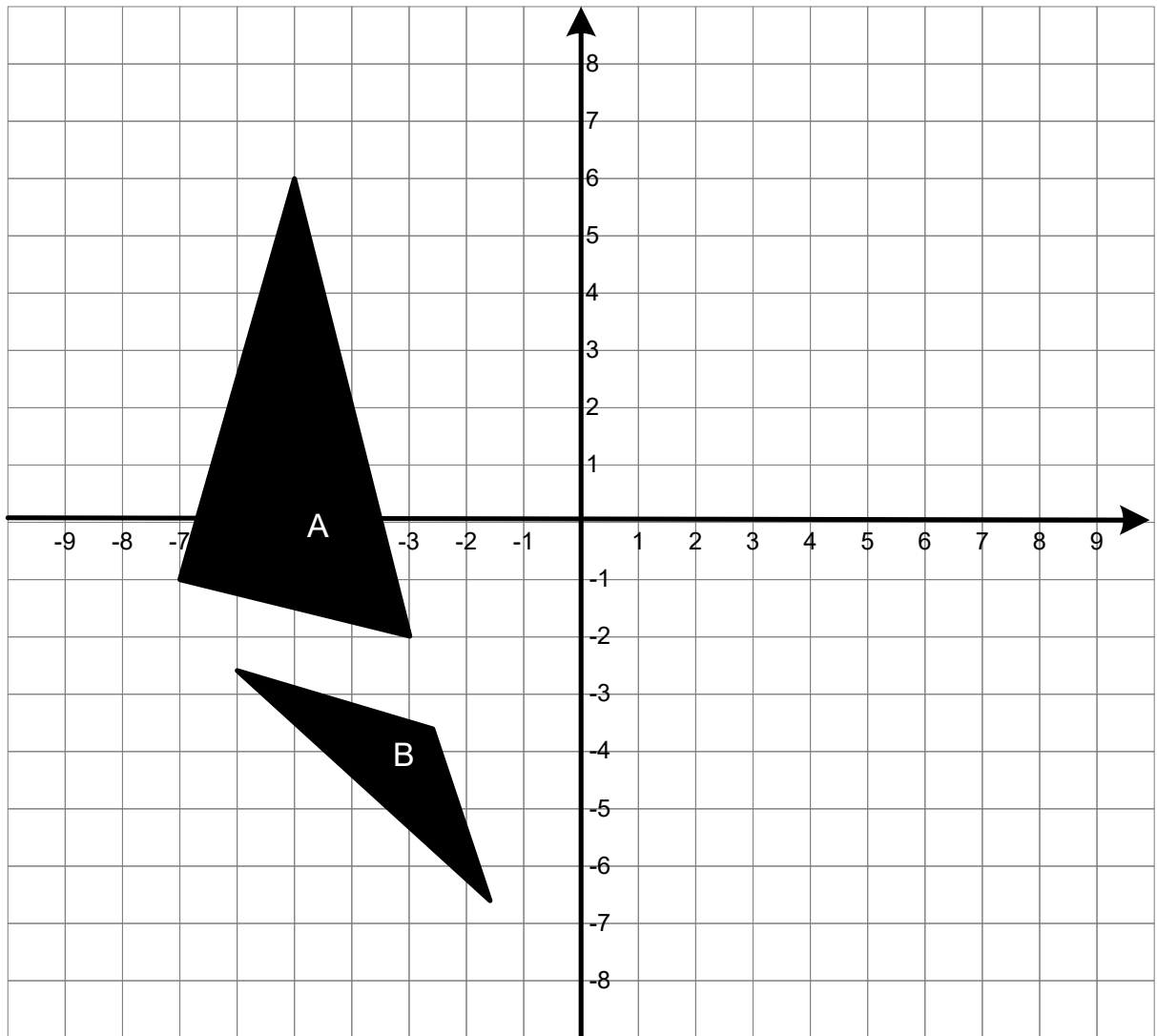
The score for the round is shown in the table below.

Score	Frequency
$0 \leq s < 12$	11
$12 \leq s < 18$	23
$18 \leq s < 25$	17
$25 \leq s < 32$	11
$32 \leq s < 45$	4

- a What is the modal class?
- b In which class interval does the median fall?
- c Calculate an estimate of the mean average points scored.

REFLECTIONS

Reflect the shapes below in the line $x=-1$.



Write down the co-ordinates of the reflection of each triangle.

STEM AND LEAF DIAGRAMS

Below is data representing the amount of money different people collected for a charity.

93	31	21	28	44	14	24	23	27	29	24	25	92
35	21	36	26	23	13	19	34	35	35	95	25	84

1 Put this information into a stem and leaf diagram.

2 What is the range of the amount of money collected by each participant?

3 What is the median of the data that has been collected?

4 Is there a mode and if so, what is it?

LINEAR EQUATIONS WITH FRACTIONS

Solve each of these equations giving your answers as mixed numbers or fractions.

1 $9x - 5 = 13$

2 $7x + 2 = 30$

3 $\frac{x}{5} + x = 12$

4 $5x + 51 = 8x - 39$