

Mock Set B – Paper 1

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1)

Foundation tier • Paper 1 (Non-Calculator)

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

Work out $-11 + 6$

Start at -11 on a number line and move 6 to the right.

$$-11 + 6 = -5$$

Answer: -5

Tip: Adding a positive number moves you to the right, towards zero. The answer is not -17 or 5 .

2 (1 mark)

Write 0.9 as a fraction.

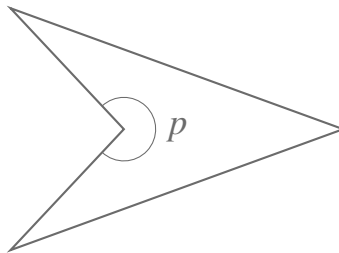
The 9 is in the tenths column.

$$0.9 = \frac{9}{10}$$

Answer: $\frac{9}{10}$

3 (1 mark)

Here is a quadrilateral.



Write down the mathematical name for the type of angle marked p .

The angle p is on the inside of the shape at the dent.

It is more than half a turn (180°) but less than a full turn (360°).

So it is a reflex angle.

Answer: Reflex

Tip: Acute is less than 90° , obtuse is between 90° and 180° , reflex is between 180° and 360° .

4 (1 mark)

Simplify $m + m + m + m + m + m$

There are six lots of m .

$$m + m + m + m + m + m = 6m$$

Answer: $6m$

Tip: Adding the same letter is like counting: six ms is $6m$. It is not m^6 .

5 (1 mark)

Write down the multiple of 9 that is between 60 and 70

Multiples of 9: 9, 18, 27, 36, 45, 54, 63, 72, ...

The only one between 60 and 70 is 63.

Answer: 63

6 (4 marks)

The pictogram shows information about the number of loaves of bread a bakery sold on Monday, on Tuesday and on Wednesday one week.

Monday	
Tuesday	
Wednesday	
Thursday	

Key:  represents 8 loaves

- (a) How many loaves did the bakery sell on Tuesday?

One circle is 8 loaves, so a quarter circle is $8 \div 4 = 2$ loaves and three quarters of a circle is 6 loaves.

Tuesday: 3 whole circles and $\frac{3}{4}$ of a circle.

$$3 \times 8 + 6 = 30$$

Answer: 30

Tip: Work out what a quarter of a symbol is worth first: $8 \div 4 = 2$. Then three quarters is $3 \times 2 = 6$.

- (b) On Thursday, the bakery sold 6 more loaves than on Tuesday.
Use this information to complete the pictogram.

Thursday: $30 + 6 = 36$ loaves.

$36 \div 8 = 4$ remainder 4, so 4 whole circles and 4 loaves more.

4 loaves is half of a circle.

Draw 4 whole circles and a half circle.

Monday	
Tuesday	
Wednesday	
Thursday	

Key:  represents 8 loaves

Answer: 4 whole circles and a half circle drawn for Thursday

Tip: 36 is not a multiple of 8, so you need part of a circle: $4 \times 8 = 32$, and the extra 4 is half a circle.

Marks: 1 mark for working out 36 loaves (or for 4 whole circles). 1 mark for $4\frac{1}{2}$ circles drawn.

(c) How many more loaves did the bakery sell on Thursday than on Wednesday?

Wednesday: 1 whole circle and $\frac{3}{4}$ of a circle = $8 + 6 = 14$ loaves.

Thursday: 36 loaves.

$$36 - 14 = 22$$

Answer: 22

7 (4 marks)

Ajay buys some food for a picnic.

He buys

4 cartons of juice at 75p each

some sandwiches costing £2.85 each.

Ajay pays with a £20 note.

He gets £2.75 change.

How many sandwiches did Ajay buy?

$$\text{Ajay spent } £20 - £2.75 = £17.25$$

$$\text{Juice: } 4 \times 75\text{p} = 300\text{p} = £3.00$$

$$\text{Sandwiches: } £17.25 - £3.00 = £14.25$$

Count up in £2.85: 2.85, 5.70, 8.55, 11.40, 14.25

That is 5 lots of £2.85, so Ajay bought 5 sandwiches.

Answer: 5

Tip: Keep the units the same: change 75p into £0.75 (or work in pence all the way through). Then subtract the juice before dividing by £2.85.

Marks: 1 mark for $20 - 2.75$ or for the cost of the juice (£3). 1 mark for the amount spent on sandwiches (£14.25). 1 mark for a complete method to find the number of sandwiches. 1 mark for 5.

8 (3 marks)

Jiya has a red ribbon, a blue ribbon and a green ribbon.

The red ribbon is x cm long.

The blue ribbon is 7 cm longer than the red ribbon.

The green ribbon is 3 times as long as the red ribbon.

- (a) Write down an expression, in terms of x , for the length of the blue ribbon.

The blue ribbon is 7 cm longer, so add 7.

Length = $x + 7$

Answer: $x + 7$

Tip: “Longer” means add. $7x$ would mean 7 times as long.

- (b) Write down an expression, in terms of x , for the length of the green ribbon.

The green ribbon is 3 times as long, so multiply by 3.

Length = $3 \times x = 3x$

Answer: $3x$

- (c) The green ribbon is 54 cm long.

Work out the length of the red ribbon.

$3x = 54$

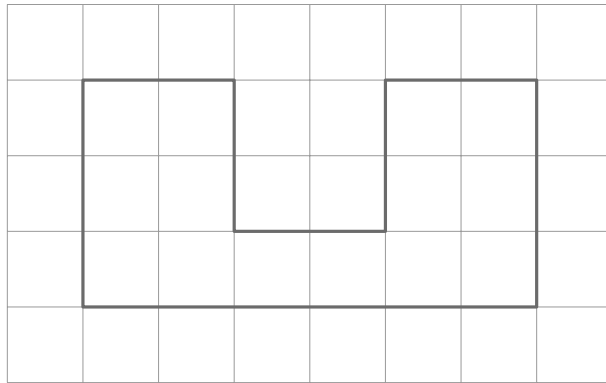
$$x = 54 \div 3 = 18$$

Answer: 18 cm

Tip: The green ribbon is 3 times as long as the red one, so divide by 3. Do not multiply 54 by 3.

9 (2 marks)

Here is a shape drawn on a centimetre grid.



(a) Find the area of the shape.

Each square is 1 cm^2 .

Count the squares: the bottom row has 6 and each arm has $2 \times 2 = 4$.

$$6 + 4 + 4 = 14$$

Answer: 14 cm^2

(b) Find the perimeter of the shape.

Go round the outside and add the lengths of the sides.

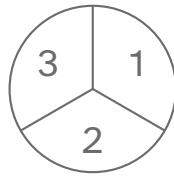
$$6 + 3 + 2 + 2 + 2 + 2 + 2 + 3 = 22$$

Answer: 22 cm

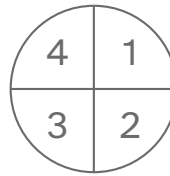
Tip: Perimeter is the distance around the outside. Count the edges of the squares, not the squares. Do not miss the sides inside the gap.

10 (3 marks)

Here are two fair spinners at a fairground game.



Spinner *A*



Spinner *B*

Maddie spins both spinners.

She adds the number spinner *A* lands on to the number spinner *B* lands on to get the total.

- (a) Complete the table to show all the possible totals.

Each total is the number on spinner *A* plus the number on spinner *B*.

For example, $2 + 3 = 5$ and $3 + 3 = 6$.

		Spinner <i>B</i>				
		+	1	2	3	4
Spinner <i>A</i>	1	2	3	4	5	
	2	3	4	5	6	
	3	4	5	6	7	

Answer: Row 1: 2, 3, 4, 5. Row 2: 3, 4, 5, 6. Row 3: 4, 5, 6, 7

Marks: 2 marks for all six missing totals correct. 1 mark for at least four correct.

- (b) Chen says,

“A total of 4 is more likely than any other total.”

Is Chen correct?

Give a reason for your answer.

There are 12 equally likely outcomes in the table.

A total of 4 appears 3 times: $P(4) = \frac{3}{12}$

A total of 5 also appears 3 times: $P(5) = \frac{3}{12}$

So 4 is not more likely than 5. Chen is not correct.

Answer: No: a total of 5 is just as likely as a total of 4 (both are $\frac{3}{12}$).

Tip: Count every total in your table. Two totals can share the highest probability.

11 (2 marks)

At a concert there are 84 adults and 36 children.

Write down the ratio number of adults : number of children.

Give your ratio in its simplest form.

Start with 84:36

Divide both by 12: $84 \div 12 = 7$ and $36 \div 12 = 3$

7:3 cannot be simplified any more.

Answer: 7:3

Tip: Keep dividing until the only common factor is 1. 14:6 can still be divided by 2. Keep the order: adults first.

Marks: 1 mark for 84:36 or a partly simplified ratio, eg 42:18 or 14:6. 1 mark for 7:3.

12 (3 marks)

The diagram shows a shaded shape and a mirror line on a grid.

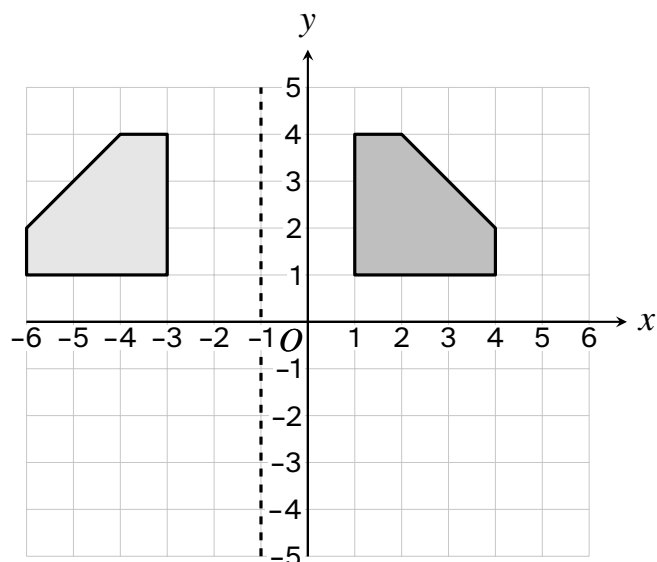
(a) On the grid, reflect the shaded shape in the mirror line.

The mirror line is the dashed vertical line through -1 on the x -axis.

Take each corner in turn. Count how far it is from the mirror line, then count the same distance on the other side.

For example, $(4, 2)$ is 5 squares to the right of the line, so its image $(-6, 2)$ is 5 squares to the left.

Image corners: $(-3, 1)$, $(-6, 1)$, $(-6, 2)$, $(-4, 4)$, $(-3, 4)$



Answer: Shape with corners $(-3, 1)$, $(-6, 1)$, $(-6, 2)$, $(-4, 4)$, $(-3, 4)$

Tip: Reflect the shape in the dashed line, not in the y -axis. Each image corner must be the same distance from the mirror line as the original corner.

Marks: 2 marks for a correct reflection. 1 mark for a reflection in a different vertical line, or for 4 corners correct.

- (b) Write down the equation of the mirror line.

Every point on the mirror line has x -coordinate -1 .

So the equation is $x = -1$.

Answer: $x = -1$

Tip: A vertical line has an equation $x = \dots$, not $y = \dots$

13 (2 marks)

Hollie is taking part in a 1 km charity walk.

She has walked 350 m.

Hollie says,

“I have walked more than $\frac{1}{3}$ of the walk.”

Is Hollie correct?

You must show how you get your answer.

Use the same units: 1 km = 1000 m.

$\frac{1}{3}$ of the walk is $1000 \div 3 = 333.3 \dots$ m

Hollie has walked 350 m, and 350 is more than 333.3 ...

So Hollie is correct.

(Or: $\frac{350}{1000} = \frac{7}{20} = \frac{21}{60}$ and $\frac{1}{3} = \frac{20}{60}$, so $\frac{350}{1000}$ is bigger.)

Answer: Yes: $\frac{1}{3}$ of 1000 m is 333.3 ... m, and 350 m is more than this.

Tip: Change km to m first so both amounts are in the same units. Then compare: work out $\frac{1}{3}$ of 1000 m, or turn both fractions into decimals.

Marks: 1 mark for $1000 \div 3$ (or for writing $\frac{350}{1000}$ and $\frac{1}{3}$ in a form you can compare). 1 mark for “Yes” with a correct comparison.

14 (2 marks)

Given that $7.4 \times 2.6 = 19.24$

(a) Work out 740×2.6

$$740 = 7.4 \times 100$$

$$\text{So } 740 \times 2.6 = 7.4 \times 2.6 \times 100 = 19.24 \times 100$$

$$= 1924$$

Answer: 1924

Tip: Check with an estimate: $700 \times 3 = 2100$, so about 2000 is sensible.

(b) Work out $19.24 \div 26$

$$7.4 \times 2.6 = 19.24, \text{ so } 19.24 \div 2.6 = 7.4$$

26 is 10 times bigger than 2.6, so the answer is 10 times smaller.

$$7.4 \div 10 = 0.74$$

Answer: 0.74

Tip: Dividing by a bigger number gives a smaller answer. Check: $0.74 \times 26 = 19.24$.

15 (2 marks)

Here are the first five terms of a number sequence.

3 11 19 27 35

Find an expression, in terms of n , for the n th term of this sequence.

The terms go up by 8 each time, so the n th term starts with $8n$.

$8n$ gives 8, 16, 24, 32, 40

Each term of the sequence is 5 less than this.

$$n\text{th term} = 8n - 5$$

Check: $n = 1$ gives $8 - 5 = 3$ ✓

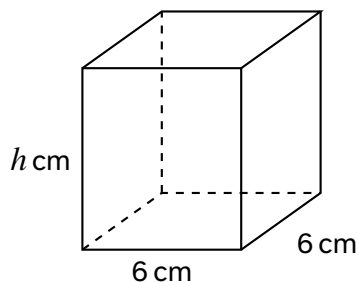
Answer: $8n - 5$

Tip: The difference goes in front of n . Then compare $8n$ with the sequence to find the number to add or take away. $n + 8$ is the term-to-term rule, not the n th term.

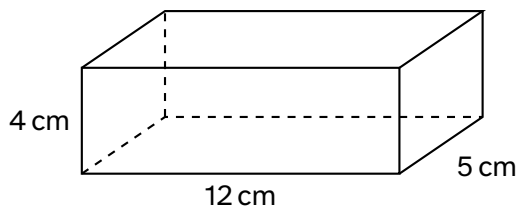
Marks: 1 mark for $8n$. 1 mark for $8n - 5$.

16 (5 marks)

Here are two cuboids, *A* and *B*.



Cuboid A



Cuboid B

Diagram NOT accurately drawn

- (a) Cuboid *A* has a square base of side 6 cm.

The volume of cuboid *A* is 252 cm^3

Work out the value of h .

Area of the square base: $6 \times 6 = 36 \text{ cm}^2$

Volume = area of base $\times$ height, so $36 \times h = 252$

$$h = 252 \div 36 = 7$$

Answer: $h = 7$

Tip: Find the area of the base first (6×6), then divide the volume by it. $252 \div 6 = 42$ is not the height.

Marks: 1 mark for $252 \div 36$ (or $252 \div 6 \div 6$). 1 mark for 7.

- (b) Zuzanna's box is cuboid *B*, 12 cm by 5 cm by 4 cm. She has 250 cm^2 of paper to cover all six faces. Does she have enough paper?

The faces come in three pairs.

Top and bottom: $12 \times 5 = 60 \text{ cm}^2$ each

Front and back: $12 \times 4 = 48 \text{ cm}^2$ each

Two ends: $5 \times 4 = 20 \text{ cm}^2$ each

Total surface area: $2 \times 60 + 2 \times 48 + 2 \times 20 = 120 + 96 + 40 = 256 \text{ cm}^2$

256 is more than 250, so Zuzanna does not have enough paper.

Answer: No: the surface area is 256 cm^2 , which is more than 250 cm^2 .

Tip: This is about surface area, not volume. The volume $12 \times 5 \times 4 = 240$ is less than 250, but that does not tell you how much paper you need.

Marks: 1 mark for the areas of two different faces (60, 48 or 20). 1 mark for the total surface area, 256. 1 mark for “No” with 256.

17 (3 marks)

Work out $8.12 \div 0.14$

Multiply both numbers by 100 so that you divide by a whole number.

$$8.12 \div 0.14 = 812 \div 14$$

$$14 \times 50 = 700, \text{ leaving } 812 - 700 = 112$$

$$14 \times 8 = 112$$

$$\text{So } 812 \div 14 = 50 + 8 = 58$$

$$\text{Check: } 58 \times 0.14 = 8.12 \quad \checkmark$$

Answer: 58

Tip: Make the number you divide by a whole number, and do the same to the other number. Dividing by a number less than 1 makes the answer bigger.

Marks: 1 mark for $812 \div 14$ (both numbers multiplied by the same power of 10). 1 mark for a complete division method. 1 mark for 58.

18 (4 marks)

Callum drives a coach from a depot to an airport.

He leaves the depot at 09 40

The distance from the depot to the airport is 105 miles.

On the way, Callum stops for a 25-minute break.

Callum thinks the coach will travel at an average speed of 45 miles per hour while it is being driven.

- (a) If Callum is right, at what time will the coach arrive at the airport?

45 miles takes 1 hour, so 90 miles takes 2 hours.

The last 15 miles is $\frac{1}{3}$ of 45 miles, so it takes $\frac{1}{3}$ of an hour = 20 minutes.

Driving time: 2 hours 20 minutes

Total time with the break: 2 h 20 min + 25 min = 2 h 45 min

09 40 + 2 h = 11 40, then + 45 min = 12 25

Answer: 12 25

Tip: $105 \div 45 = 2.33 \dots$ hours is **not** 2 hours 33 minutes. 0.33 ... of an hour is 20 minutes. Do not forget the break.

Marks: 1 mark for the driving time (2 hours 20 minutes, or 140 minutes). 1 mark for adding the driving time and the 25 minutes to 09 40. 1 mark for 12 25.

- (b) In fact, the average speed of the coach while it was being driven was less than 45 miles per hour.

How does this affect your answer to part (a)?

A lower speed means the 105 miles take longer to drive.

So the coach arrives later than 12 25.

Answer: The coach would arrive later than 12 25, because the journey would take longer.

Tip: Say what happens to the arrival time and why. "It changes the answer" is not enough.

19 (5 marks)

- (a) Work out $1\frac{2}{3} + 2\frac{3}{5}$
Give your answer as a mixed number.

Add the whole numbers: $1 + 2 = 3$

Add the fractions using 15 as the common denominator: $\frac{2}{3} + \frac{3}{5} = \frac{10}{15} + \frac{9}{15} = \frac{19}{15}$

$$\frac{19}{15} = 1\frac{4}{15}$$

$$3 + 1\frac{4}{15} = 4\frac{4}{15}$$

Answer: $4\frac{4}{15}$

Tip: $\frac{19}{15}$ is more than 1. Change it to $1\frac{4}{15}$ and add it to the 3 whole ones.

Marks: 1 mark for fractions with a common denominator, eg $\frac{10}{15} + \frac{9}{15}$ or $\frac{25}{15} + \frac{39}{15}$. 1 mark for $4\frac{4}{15}$.

- (b) Show that $4\frac{1}{2} \div 1\frac{1}{5} = 3\frac{3}{4}$

Write both as improper fractions: $4\frac{1}{2} = \frac{9}{2}$ and $1\frac{1}{5} = \frac{6}{5}$

Dividing by $\frac{6}{5}$ is the same as multiplying by $\frac{5}{6}$.

$$\frac{9}{2} \times \frac{5}{6} = \frac{45}{12}$$

$$\frac{45}{12} = \frac{15}{4} \text{ (divide top and bottom by 3)}$$

$$\frac{15}{4} = 3\frac{3}{4}$$

Answer: $\frac{9}{2} \times \frac{5}{6} = \frac{45}{12} = \frac{15}{4} = 3\frac{3}{4}$

Tip: Change mixed numbers into improper fractions first. Only the second fraction is turned upside down.

Marks: 1 mark for both improper fractions. 1 mark for multiplying by $\frac{5}{6}$ (or using a common denominator). 1 mark for a full method that ends with $3\frac{3}{4}$.

20 (3 marks)

Nadia asked 15 students how many minutes they spent on homework last night. Here are her results.

18 32 25 41 16 37 23 29 44 35 21 38 26 47 31

Show this information in an ordered stem and leaf diagram.

The stems are the tens digits: 1, 2, 3, 4.

The leaves are the units digits, written in order from smallest to largest.

Add a key to show how to read the diagram.

1	6 8
2	1 3 5 6 9
3	1 2 5 7 8
4	1 4 7

Key: 2 | 5 represents 25 minutes

Check: $2 + 5 + 5 + 3 = 15$ leaves ✓

Answer: See the ordered stem and leaf diagram with key 2 | 5 represents 25 minutes

Tip: Three things lose marks: leaves not in order, a missing key, and a missing value. Count the leaves at the end: there should be 15.

Marks: 3 marks for a fully correct ordered diagram with a key. 2 marks for a correct ordered diagram with no key or one error, or a correct unordered diagram with a key. 1 mark for a diagram with no more than two errors, or for a key.

21 (4 marks)

ABC is a straight line.

BCD is a triangle with $DB = DC$.

$$x:y = 7:2$$

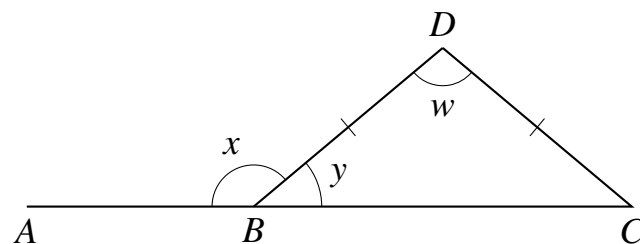


Diagram **NOT** accurately drawn

Work out the value of w .

You must show all your working.

ABC is a straight line, so $x + y = 180$.

$x:y = 7:2$ has $7 + 2 = 9$ parts, so one part is $180 \div 9 = 20$.

$y = 2 \times 20 = 40$ (and $x = 7 \times 20 = 140$)

$DB = DC$, so triangle BCD is isosceles and angle $DCB = \text{angle } DBC = 40^\circ$.

Angles in a triangle add up to 180° : $w = 180 - 40 - 40 = 100$

Answer: $w = 100$

Tip: The ratio is for the two angles on the straight line, so share 180° in the ratio 7:2. Then use the equal sides: the two base angles of the triangle are equal.

Marks: 1 mark for $180 \div 9$ (one part is 20). 1 mark for $y = 40$ and the other base angle 40. 1 mark for $180 - 2 \times 40$. 1 mark for 100.

22 (4 marks)

Saanvi fills an empty garden pond with water.

The pond holds 3140 litres of water when it is full.

Water flows into the pond at a rate of 19.6 litres per minute.

- (a) Work out an estimate for the number of hours it takes to fill the pond.

Round each number to 1 significant figure: $3140 \approx 3000$ and $19.6 \approx 20$

Time in minutes $\approx 3000 \div 20 = 150$ minutes

Change to hours: $150 \div 60 = 2.5$ hours

Answer: 2.5 hours

Tip: The rate is in litres per **minute**, so $3000 \div 20$ gives minutes. Divide by 60 to change minutes into hours. 150 minutes is not 1.5 hours.

Marks: 1 mark for rounding both numbers. 1 mark for $3000 \div 20$. 1 mark for 2.5 hours.

- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

3140 was rounded **down**, so the volume used is too small.

19.6 was rounded **up**, so the water is assumed to flow in faster than it really does.

Both changes make the time shorter than it really is.

So 2.5 hours is an underestimate.

Answer: Underestimate: 3140 was rounded down and 19.6 was rounded up, so the real time is longer.

Tip: Dividing by a bigger number gives a smaller answer. Think about what each rounding does to the time.

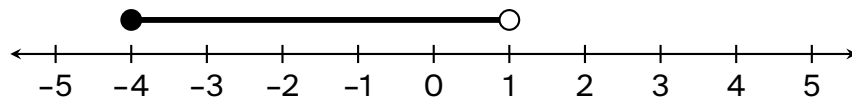
23 (4 marks)

- (a) Show the inequality $-4 \leq x < 1$ on the number line.

$-4 \leq x$: x can equal -4 , so draw a filled-in (solid) circle at -4 .

$x < 1$: x cannot equal 1, so draw an empty (open) circle at 1.

Join the two circles with a line.



Answer: Solid circle at -4 , open circle at 1, joined by a line

Tip: $\leq$ means “included”, so use a filled-in circle. $<$ means “not included”, so use an open circle.

Marks: 2 marks for a fully correct diagram. 1 mark for a line from -4 to 1 with one end wrong, or both circles correct with no line.

- (b) Solve $9x + 2 \leq 5x + 20$

Take $5x$ from both sides: $4x + 2 \leq 20$

Take 2 from both sides: $4x \leq 18$

Divide both sides by 4: $x \leq 4.5$

Answer: $x \leq 4.5$

Tip: Treat it like an equation but keep the inequality sign all the way through. The answer is $x \leq 4.5$, not $x = 4.5$.

Marks: 1 mark for $4x \leq 18$ (or $4x$ and 18 on opposite sides). 1 mark for $x \leq 4.5$.

24 (2 marks)

A vending machine in a museum exerts a force of 2400 newtons on the floor. The part of the vending machine in contact with the floor is a rectangle 0.8 m by 0.75 m.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the pressure exerted on the floor by the vending machine.
Give your answer in newtons/m²

Area in contact with the floor: $0.8 \times 0.75 = 0.6 \text{ m}^2$

$$\text{Pressure} = \frac{\text{force}}{\text{area}} = \frac{2400}{0.6}$$

$$2400 \div 0.6 = 24\,000 \div 6 = 4000$$

Answer: 4000 newtons/m²

Tip: Work out the area first: $0.8 \times 0.75 = 0.6$, not 6 or 0.06. Dividing by 0.6 makes the answer bigger.

Marks: 1 mark for $2400 \div (0.8 \times 0.75)$. 1 mark for 4000.

25 (4 marks)

a , b and c are three numbers.

$$a:b = 4:3$$

$$b:c = 5:2$$

- (a) Find $a:b:c$

b is in both ratios, so make the b parts the same.

The LCM of 3 and 5 is 15.

$$a:b = 4:3 = 20:15 \text{ (multiply by 5)}$$

$$b:c = 5:2 = 15:6 \text{ (multiply by 3)}$$

$$\text{So } a:b:c = 20:15:6$$

Answer: 20:15:6

Tip: You cannot just write 4:3:5:2 or 4:3:2. Make the number for b the same in both ratios first.

Marks: 1 mark for 20:15 or 15:6. 1 mark for 20:15:6.

- (b) Write a as a fraction of $a + b + c$

$$\text{Total number of parts: } 20 + 15 + 6 = 41$$

a is 20 of the 41 parts.

$$a \text{ as a fraction of } a + b + c \text{ is } \frac{20}{41}$$

Answer: $\frac{20}{41}$

Tip: Use the total of all three parts as the denominator. $\frac{20}{21}$ (20 out of 15 + 6) is the wrong fraction.

Marks: 1 mark for adding the parts of the three-part ratio (41). 1 mark for $\frac{20}{41}$.

26 (5 marks)

A craft shop sells balls of wool and packs of buttons.

2 balls of wool and 3 packs of buttons cost £19.50

1 ball of wool and 2 packs of buttons cost £11.50

Molly wants to buy 4 balls of wool and 3 packs of buttons.

She has £28

Does Molly have enough money?

You must show all your working.

Let w be the cost of a ball of wool and b the cost of a pack of buttons, in pounds.

$$2w + 3b = 19.50 \quad (1)$$

$$w + 2b = 11.50 \quad (2)$$

$$\text{Double (2): } 2w + 4b = 23.00 \quad (3)$$

$$(3) - (1): b = 3.50$$

$$\text{Put } b = 3.50 \text{ into (2): } w + 7 = 11.50, \text{ so } w = 4.50$$

$$\text{Check in (1): } 2 \times 4.50 + 3 \times 3.50 = 9 + 10.50 = 19.50 \quad \checkmark$$

$$4 \text{ balls of wool and 3 packs of buttons: } 4 \times 4.50 + 3 \times 3.50 = 18 + 10.50 = \text{£}28.50$$

£28.50 is more than £28, so Molly does not have enough money (she is 50p short).

Answer: No: she needs £28.50, which is more than £28.

Tip: Write two equations and make the number of one item the same in both (double the second one). Then subtract to find one price.

Marks: 1 mark for a correct start to eliminate one item, eg doubling the second offer. 1 mark for one correct price. 1 mark for both prices (£4.50 and £3.50). 1 mark for $4 \times 4.50 + 3 \times 3.50$. 1 mark for “No” with £28.50.

27 (3 marks)

(a) Katie says,
“ 4^{-2} is a negative number.”

Is Katie correct?

Give a reason for your answer.

A negative power means “one over”: $4^{-2} = \frac{1}{4^2}$

$$\frac{1}{4^2} = \frac{1}{16}, \text{ which is positive.}$$

So Katie is not correct.

Answer: No: $4^{-2} = \frac{1}{16}$, which is a positive number.

Tip: A negative power gives a reciprocal, not a negative number: $4^{-2} = \frac{1}{16}$, not -16 or -8 .

(b) Write $\frac{2^9 \times 8}{2^5}$ as a power of 2

Write 8 as a power of 2: $8 = 2 \times 2 \times 2 = 2^3$

Multiply: add the powers. $2^9 \times 2^3 = 2^{12}$

Divide: subtract the powers. $2^{12} \div 2^5 = 2^7$

Answer: 2^7

Tip: Write every number as a power of 2 first. 8 is 2^3 , not 2^8 or 2^4 .

Marks: 1 mark for $8 = 2^3$ or for 2^{12} . 1 mark for 2^7 .

28 (2 marks)

$$\mathbf{c} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} \quad \mathbf{d} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$$

Work out $3\mathbf{c} - 2\mathbf{d}$

Write your answer as a column vector.

$$3\mathbf{c} = 3 \begin{pmatrix} 3 \\ -2 \end{pmatrix} = \begin{pmatrix} 9 \\ -6 \end{pmatrix}$$

$$2\mathbf{d} = 2 \begin{pmatrix} -1 \\ 4 \end{pmatrix} = \begin{pmatrix} -2 \\ 8 \end{pmatrix}$$

$$3\mathbf{c} - 2\mathbf{d} = \begin{pmatrix} 9 - (-2) \\ -6 - 8 \end{pmatrix} = \begin{pmatrix} 11 \\ -14 \end{pmatrix}$$

Answer: $\begin{pmatrix} 11 \\ -14 \end{pmatrix}$

Tip: Work on the top numbers and the bottom numbers separately. Take care with $9 - (-2) = 11$.

Marks: 1 mark for $3\mathbf{c}$ or $2\mathbf{d}$ correct, or one correct component. 1 mark for the fully correct vector.
