



BRITISH LEARNING CENTRE

PEARSON EDEXCEL INTERNATIONAL GCSE · 4MA1

Mathematics

Exam Practice

Exam technique, calculator and accuracy skills, and four original practice papers in the style of Pearson Edexcel International GCSE Mathematics A Papers 1F, 2F, 1H and 2H, with full mark schemes.

Name:

Key knowledge · Practice · Exam-style questions · Mark schemes

How to use this workbook

1 Key knowledge
 Read the notes, worked examples and common mistakes.

2 Practice
 Build the skill on Sheet A.

3 Exam-style
 Answer exam-style questions on Sheet B. Marks are shown in [].

4 Check & reflect
 Mark your work with the mark scheme, then colour the tracker.

My progress tracker

Colour each row: **Red** = not yet · **Amber** = nearly · **Green** = secure.

#	Spec ref	Topic · I can...	R	A	G
1	Papers 1F, 2F, 1H, 2H Foundation & Higher	Exam technique and command words I can read exam questions carefully, show working that earns marks and give answers to the right accuracy.			
2	Papers 1F, 2F, 1H, 2H Foundation & Higher	Calculator skills I can use a scientific calculator efficiently and accurately on every 4MA1 paper.			
3	Papers 1F, 2F, 1H, 2H Foundation & Higher	Accuracy, estimation and bounds I can round, estimate, write error intervals and calculate upper and lower bounds.			
4	Paper 1F Foundation	Foundation Paper 1F practice paper I can complete a Foundation Paper 1F style paper accurately within the time.			
5	Paper 2F Foundation	Foundation Paper 2F practice paper I can complete a Foundation Paper 2F style paper accurately within the time.			
6	Paper 1H Higher	Higher Paper 1H practice paper I can complete a Higher Paper 1H style paper accurately within the time.			
7	Paper 2H Higher	Higher Paper 2H practice paper I can complete a Higher Paper 2H style paper accurately within the time.			
8	Papers 1F, 2F, 1H, 2H Foundation & Higher	Mixed problem solving I can choose and combine methods from different topics to solve unfamiliar, multi-step problems.			



CHECK

Starting point check

Starting point check

Name _____ Date _____ Score _____ / 14

A quick check of the skills that every paper uses. Use a calculator. Give non-exact answers to 3 significant figures.

1

Round 0.006 385 to 3 significant figures.

2

Work out $2/3 + 3/8$.

3

Write 47 000 in standard form.

4

Solve $5x + 3 = 2x - 9$.

5

Decrease \$150 by 18%.

6

Expand and simplify $(x - 4)(x + 6)$.

7

A trapezium has parallel sides 5 cm and 9 cm and height 4 cm. Find its area.

8

Find one exterior angle of a regular decagon.

9

A bag has only red, blue and green beads. $P(\text{red}) = 0.15$, $P(\text{blue}) = 0.4$. Find $P(\text{green})$.

10

Find the range of 14, 9, 22, 17, 6.

11

Find the midpoint of (2, 7) and (8, -1).

12

The shorter sides of a right-angled triangle are 7 cm and 24 cm. Find the hypotenuse.

13

Simplify $(3a^2)^3$.

14

$\cos x = 0.25$. Find x to 1 decimal place.

Exam technique and command words

I can... read exam questions carefully, show working that earns marks and give answers to the right accuracy.

Spec ref: Papers 1F, 2F, 1H, 2H · Foundation & Higher

Pearson Edexcel International GCSE Mathematics A (4MA1) has two tiers. Foundation students sit Papers 1F and 2F; Higher students sit Papers 1H and 2H. A calculator is allowed on every paper, and both papers can test any topic.

The command words tell you **what** to do; the marks tell you **how much** working is needed.

Key words

command word

method mark (M)

accuracy mark (A)

show that

give a reason

exact answer

Key points

- Each paper: 2 hours, 100 marks, 50% of the grade.
Foundation: grades 5–1. Higher: grades 9–4 (3 allowed).
- **Write down** = little working. **Work out** = show the method.
Show that = every step. **Give a reason** = state the rule.
- 'Show clear algebraic working': a trial-and-improvement answer does not get full marks.
- M = method mark, A = accuracy mark (needs the M mark), B = independent mark.
- A formulae sheet is printed in the paper — but many formulae must be learnt.

Worked example — how the marks are awarded

Work out the area of a semicircle of radius 6 cm. Give your answer correct to 3 significant figures. (2 marks)

$$\pi \times 6^2 \div 2 = 56.5487\dots = \mathbf{56.5 \text{ cm}^2}$$

Mark scheme: M1 for $\pi \times 6^2 \div 2$; A1 for 56.5 (accept 56.54 to 56.55).

Common mistakes

- Answering a different question, e.g. giving the full circle's area.
- Giving only an answer to a 3-mark question — one slip then scores 0.
- Giving a reason such as 'because it is 180' instead of 'angles on a straight line add up to 180'.

Exam tip: Spend about 1 minute per mark and leave 10 minutes at the end to check.

Answer each question. Choose one option where options are given.

- 1 Which phrase means a trial-and-improvement answer will not get full marks?
☐ Write down ☐ Show clear algebraic working ☐ Estimate ☐ Give a reason
- 2 Which is a full reason in an angle question?
☐ because it is 180 ☐ angles on a straight line add up to 180° ☐ I measured it
☐ they look the same
- 3 Round 7.0951 to 3 significant figures.
- 4 Round 0.030 49 to 2 significant figures.
- 5 Round 864 529 to 3 significant figures.
- 6 Round 3.9973 to 2 decimal places.
- 7 Write 128.36° correct to 1 decimal place.
- 8 Write \$7.5 correctly as an amount of money.
- 9 A 3-mark question is marked M1 M1 A1. Sara writes only a wrong answer. How many marks does she score?
- 10 In a mark scheme, what does 'oe' mean?
- 11 Which answer is exact?
☐ 1.41 ☐ $\sqrt{2}$ ☐ 1.414 ☐ 1.4142
- 12 Write 45/60 in its simplest form.
- 13 Write 2.4 hours in hours and minutes.
- 14 $x^2 = 64$. Which is the complete answer?
☐ $x = 8$ ☐ $x = -8$ ☐ $x = 8$ or $x = -8$ ☐ $x = 32$

- 15 A paper has 100 marks in 2 hours. About how many minutes should you spend on a 5-mark question?

- 16 'Give your answer correct to 3 significant figures.' The display shows 0.045 628 1. Which is correct?

☐ 0.046 ☐ 0.0456 ☐ 0.04563 ☐ 0.045

- 17 Change 3 m^3 into cm^3 .

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Answer ALL questions. Show your working clearly. You may use a calculator.

- 1 (a) Show that the sum of the interior angles of a pentagon is 540° . [2]

- (b) Work out the size of one interior angle of a regular pentagon. [1]

Answer
(Total for Question 1 is 3 marks)

- 2 Tom works out the mean of 4, 7, 7, 10, 12. Here is his working.

$$4 + 7 + 7 + 10 + 12 = 40 \quad 40 \div 4 = 10$$

- (a) Explain Tom's mistake. [1]

- (b) Work out the correct mean. [1]

Answer

- (c) A sixth number is added. The mean of the six numbers is 9.
Work out the sixth number. [2]

Answer
(Total for Question 2 is 4 marks)

- 3 A theme park ticket costs \$34 for an adult and \$21 for a child. Parking costs \$12.
A group of 3 adults and 5 children arrives by car with \$250.
How much money is left after paying for the tickets and parking? [3]

Answer \$
(Total for Question 3 is 3 marks)

- 4 Show that $3(2x + 5) - 2(x - 1) = 4x + 17$.
(Total for Question 4 is 2 marks) [2]

5 A sphere has radius 4.8 cm.

(a) Work out the volume of the sphere. Give your answer correct to 3 significant figures. [2]

Answer cm³

(b) Write your answer to part (a) correct to 1 significant figure. [1]

Answer cm³

(Total for Question 5 is 3 marks)

6 Shop A sells cans of juice for \$1.20 each with the offer 'buy 2, get 1 free'.

Shop B sells the same cans for \$1.25 each with 30% off.

Ali needs 9 cans. Which shop is cheaper, and by how much? [4]

Answer Shop by \$

(Total for Question 6 is 4 marks)

7 By rounding each number to 1 significant figure, work out an estimate for $(6.12 \times 39.7) \div 0.48$ [2]

Answer

(Total for Question 7 is 2 marks)

8 PQR is an isosceles triangle with PQ = PR. Angle QPR = 46°.

Work out the size of angle PQR. Give a reason for your answer. [3]

Answer °

(Total for Question 8 is 3 marks)

9 A rectangle measures 2.4 m by 85 cm.

Work out the area of the rectangle in cm². [2]

Answer cm²

(Total for Question 9 is 2 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Calculator skills

I can... use a scientific calculator efficiently and accurately on every 4MA1 paper.

Spec ref: Papers 1F, 2F, 1H, 2H · Foundation & Higher

Every 4MA1 paper allows a calculator, so the examiners expect accurate answers to long calculations. Marks are usually lost by typing in the wrong order, using the wrong mode or rounding too early.

Write down what you type in, write the full display, then round once at the end.

Key words

brackets

ANS key

degree mode

standard form

full display

reverse percentage

Key points

- Fractions: type $(9.6^2 - 3.1^3) \div (\sqrt{27} + 4.4)$, or use the fraction key.
- Check for **degrees** mode (D or DEG) before trigonometry.
- Standard form: use the $\times 10^x$ key; write 1.2×10^8 , not 1.2E8.
- Percentage change: multiply by 1.15 for +15%, 0.91 for -9%; divide by the multiplier to reverse it.

Worked example 1

Work out $(9.6^2 - 3.1^3) \div (\sqrt{27} + 4.4)$. Give your answer to 3 significant figures.

Display: 6.4993757...

Answer: **6.50** (the zero is needed for 3 s.f.)

Worked example 2

After a 15% increase a price is \$86.25. Work out the original price.

Multiplier = 1.15, so $86.25 \div 1.15 =$ **\$75**

Common mistakes

- Typing $12 + 8 \div 4$ when you mean $(12 + 8) \div 4$.
- Writing 6.5 when 3 s.f. needs 6.50, or 86.25×0.85 for a reverse percentage.

Exam tip: Write down the calculation you type — then a typing slip can still earn the method mark.

Use a calculator. Give each answer correct to 3 significant figures unless the question says otherwise.

1 $(15.3 - 4.78) \div 2.6$

2 $\sqrt{7.5^2 + 11.2^2}$

3 $3.7^4 \div 1.9^3$

4 $1/0.8 + 1/1.25$ (exact)

5 $\cos 47^\circ$

6 $9.4 \tan 28^\circ$

7 $\sin^{-1}(4.1 \div 7.6)$ (1 d.p.)

8 $2 \times \pi \times 5.3$

9 $\pi \times 3.8^2 \times 9.5$

10 $18\,000 \times 0.88^5$ (to 2 d.p.)

11 $\sqrt{1000}$

12 $(6.1 + 2.75) \div (4.2 - 1.85)$

13 $(5.4 \times 10^6) \times (3 \times 10^{-4})$ in standard form

14 $(7.2 \times 10^5) \div (1.8 \times 10^{-3})$ in standard form

15 1.25^{-2} (exact)

16 Write 2.65 hours in hours and minutes.

17 Round 0.000 6045 to 2 s.f.

18 A price of \$64 is increased by 15%. Find the new price.

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Answer ALL questions. Show your working clearly. Give non-exact answers to 3 significant figures.

1

(a) Use your calculator to work out $(\sqrt{17.3 + 2.6^2}) \div (1.4 \times 3.9)$.

Write down all the figures on your calculator display.

[2]

Answer

(b) Give your answer to part (a) correct to 2 significant figures.

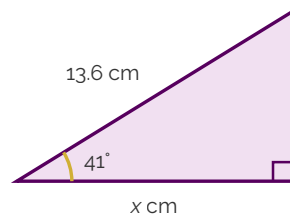
[1]

Answer

(Total for Question 1 is 3 marks)

2

Triangle P



Triangle Q

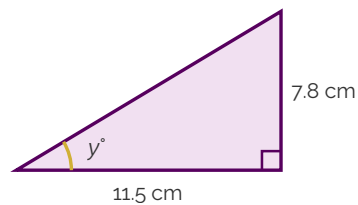


Diagram NOT accurately drawn

(a) Work out the length x in triangle P.

[2]

Answer $x =$ cm

(b) Work out the size of angle y in triangle Q. Give your answer correct to 1 decimal place. [2]

Answer $y =$ °

(Total for Question 2 is 4 marks)

3 A car is bought for \$21 000. Its value depreciates by 9% each year.

(a) Work out the value of the car after 4 years. Give your answer to the nearest dollar. **[2]**

Answer \$

(b) After how many complete years is the value first less than \$12 000? **[2]**

Answer

(Total for Question 3 is 4 marks)

4 A cylinder has radius 6.5 cm and height 14 cm.

(a) Work out the volume of the cylinder. **[2]**

Answer cm³

(b) Work out the total surface area of the cylinder. **[3]**

Answer cm²

(Total for Question 4 is 5 marks)

5 Light travels at 3×10^8 metres per second. The distance from the Sun to the Earth is 1.5×10^{11} metres.

(a) Work out the time taken for light to travel from the Sun to the Earth. Give your answer in seconds. **[2]**

Answer s

(b) Change your answer to part (a) into minutes. **[1]**

Answer min

(Total for Question 5 is 3 marks)

- 6 In a sale, the price of a jacket is increased by 15% to \$86.25.

Work out the price of the jacket before the increase.

[3]

Answer \$

(Total for Question 6 is 3 marks)

- 7 A train travels 255 km in 3 hours 24 minutes.

Work out the average speed of the train in km/h.

[3]

Answer km/h

(Total for Question 7 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Accuracy, estimation and bounds

I can... round, estimate, write error intervals and calculate upper and lower bounds.

Spec ref: Papers 1F, 2F, 1H, 2H · Foundation & Higher

Measurements are never exact. A length of 7.4 cm correct to 1 decimal place could be anything from 7.35 cm up to (but not including) 7.45 cm. These are its **lower** and **upper bounds**.

Estimating by rounding each number to 1 significant figure lets you check a calculator answer quickly.

Key points

- Bounds: half a unit either side. 40 to the nearest 10 $\rightarrow 35 \leq x < 45$.
- Truncating cuts digits off: 3.78 truncated to 1 d.p. is 3.7, so $3.7 \leq x < 3.8$.
- Biggest $a + b$: UB + UB. Biggest $a - b$: UB(a) - LB(b).
- Biggest $a \div b$: UB(a) $\div$ LB(b). (Higher)

Key words

significant figures

truncate

estimate

error interval

upper bound

lower bound

Worked example

$a = 7.4$ and $b = 2.6$, both correct to 1 decimal place. Work out the upper bound of $a - b$.

UB(a) = 7.45 and LB(b) = 2.55

Upper bound of $a - b = 7.45 - 2.55 = 4.9$

Common mistakes

- Writing the upper bound of 6.3 as 6.349 or 6.34 — it is 6.35.
- Using UB - UB for the biggest difference.
- Rounding 0.48 to 0 when estimating — round to 1 s.f., so 0.5.

Exam tip: For a 'suitable degree of accuracy', round both bounds: give the answer to the accuracy at which they agree.

Answer each question. Use a calculator only where you need one.

1 Round 5.6489 to 2 d.p.

2 Round 0.000 7381 to 2 s.f.

3 Truncate 8.976 to 1 d.p.

4 Estimate 61.8×0.49

5 Estimate $(812 + 196) \div 4.87$

6 Estimate $\sqrt{99.2} \times 3.1$

7 $x = 40$ to the nearest 10. Write the error interval.

8 $y = 6.3$ to 1 d.p. Write the lower bound.

9 $m = 250$ g to the nearest 5 g. Write the upper bound.

10 $t = 4.7$ s to 2 s.f. Write the error interval.

11 $n = 3.4$ after truncating to 1 d.p. Write the error interval.

12 $a = 8$ and $b = 3$, both to the nearest whole number. Upper bound of $a + b$?

13 Same a and b . Lower bound of $a - b$?

14 $p = 12$ and $q = 4$, both to the nearest whole number. Upper bound of $p \div q$ (3 s.f.)?

15 A square has side 5 cm to the nearest cm. Lower bound of its area?

16 Round 3495 to 2 s.f.

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Answer ALL questions. Show your working clearly.

- 1 (a) By rounding each number to 1 significant figure, work out an estimate for $(4.87 \times 21.3) \div 0.198$ [2]

Answer

- (b) Use your calculator to work out the exact value, correct to 3 significant figures. [1]

Answer

(Total for Question 1 is 3 marks)

- 2 A rectangle has length 12.5 cm and width 8.2 cm, both correct to 1 decimal place.

- (a) Work out the lower bound of the perimeter. [2]

Answer cm

- (b) Work out the upper bound of the area. [2]

Answer cm²

(Total for Question 2 is 4 marks)

- 3 A runner runs 200 m, correct to the nearest metre, in 24.8 s, correct to the nearest 0.1 s.

- (a) Work out the upper bound of the runner's average speed. Give your answer correct to 3 significant figures. [3]

Answer m/s

- (b) Work out the average speed to a suitable degree of accuracy. Give a reason for your answer. [2]

Answer m/s

(Total for Question 3 is 5 marks)

- 4 Ali truncates a number x to 1 decimal place. The result is 6.2
Write down the error interval for x .

[2]

Answer $\leq x <$
(Total for Question 4 is 2 marks)

- 5 A metal cube has mass 650 g, correct to the nearest 10 g. Each side is 5.4 cm, correct to the nearest 0.1 cm.
Work out the lower bound for the density of the metal. Give your answer correct to 3 significant figures.

[4]

Answer g/cm³
(Total for Question 5 is 4 marks)

- 6 $a = 3.6$ correct to 1 decimal place and $b = 0.48$ correct to 2 decimal places. $c = a \div b$
Work out the upper bound of c . Give your answer correct to 3 significant figures.

[3]

Answer
(Total for Question 6 is 3 marks)

- 7 Mia says, '3.86 rounded to 1 significant figure is 3.9'.
Explain why Mia is wrong.

(Total for Question 7 is 1 mark)

[1]

- 8 (a) Use your calculator to work out $(8.9^2 - \sqrt{52}) \div (2.35 + 1.8^3)$.
Write down all the figures on your calculator display.

[2]

Answer

- (b) Give your answer to part (a) correct to 3 significant figures.

[1]

Answer
(Total for Question 8 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Foundation Paper 1F practice paper

I can... complete a Foundation Paper 1F style paper accurately within the time.

Spec ref: Paper 1F · Foundation

Paper 1F is one of the two Foundation papers. Both papers are **calculator** papers, both last 2 hours and both can test **any** Foundation topic: number, algebra, geometry, statistics and probability.

It starts with short, accessible questions and builds to multi-step problems worth 3–5 marks.

Key words

write down

work out

show your working

give a reason

estimate

complete the table

Key points

- Real paper: 2 hours, 100 marks, calculator allowed, formulae sheet provided.
- This practice paper: 77 marks — allow about 90 minutes (Part 1 + Part 2).
- Give non-exact answers to 3 significant figures and angles to 1 decimal place unless told otherwise.
- Each paper is worth 50% of the Foundation grade (grades 5–1).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

How marks are awarded

A coat costs \$64. Its price is reduced by 15%. Work out the sale price. (3 marks)

15% of 64 = 9.60 (M1) and $64 - 9.60$ (M1), or 64×0.85 (M2)

= **\$54.40** (A1)

Common mistakes

- Copying a calculator answer wrongly, or rounding too early.
- Forgetting units, or writing money without 2 decimal places.
- Leaving a 'show your working' question with only an answer.

Exam tip: In problem-solving questions every correct step earns marks — write down every calculation, even if you cannot finish.

Answer ALL questions. You may use a calculator. Show your working clearly. Part 1: 39 marks, about 45 minutes.

- 1 40 students were asked to choose their favourite fruit.

Fruit	Frequency
Apple	12
Banana	8
Mango	15
Orange	5

- (a) What fraction of the students chose mango? Give your answer in its simplest form. [1]

Answer

- (b) What percentage of the students chose banana? [1]

Answer

- (c) The information is shown in a pie chart. Work out the angle of the sector for Orange. [2]

Answer

(Total for Question 1 is 4 marks)

- 2 A café sells tea for \$2.40, sandwiches for \$4.75 and cakes for \$3.15. Ali buys 2 teas, 1 sandwich and 3 cakes. He pays with a \$20 note. How much change should he get? [3]

Answer

(Total for Question 2 is 3 marks)

3**(a)** Work out 5^3 **[1]****Answer****(b)** Work out $\sqrt{196}$ **[1]****Answer****(c)** Use your calculator to work out $(8.3 + 2.45) \div 1.6^2$

Write down all the figures on your calculator display.

[2]**Answer****(d)** Write your answer to part (c) correct to 1 decimal place.**[1]****Answer****(Total for Question 3 is 5 marks)****4****(a)** Simplify $4m + 3m - 2m$ **[1]****Answer****(b)** Simplify $3a \times 4b$ **[1]****Answer****(c)** Solve $5x - 8 = 27$ **[2]****Answer****(d)** $T = 3n + 5$. Work out the value of T when $n = -4$ **[2]****Answer****(Total for Question 4 is 6 marks)**

- 5 ACD is a straight line. Angle BAC = 52° and angle ABC = 71° .

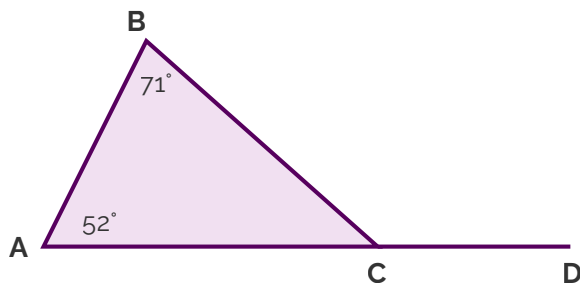


Diagram NOT accurately drawn

- (a) Work out the size of angle ACB. [1]

Answer

- (b) Work out the size of angle BCD. Give a reason for your answer. [2]

Answer

(Total for Question 5 is 3 marks)

- 6 Green paint is made by mixing blue paint and yellow paint in the ratio 2 : 5.

- (a) Mo makes 35 litres of green paint. How many litres of yellow paint does he use? [2]

Answer

- (b) Lucy has 6 litres of blue paint. How many litres of yellow paint does she need to mix with all of it? [2]

Answer

(Total for Question 6 is 4 marks)

7 Here are the first four terms of an arithmetic sequence.

4 11 18 25

(a) Write down the next two terms.

[1]

Answer

(b) Find an expression, in terms of n , for the n th term of the sequence.

[2]

Answer

(c) Is 100 a term of this sequence? You must show how you get your answer.

[2]

Answer

(Total for Question 7 is 5 marks)

8 **(a)** Work out 35% of 260

[2]

Answer

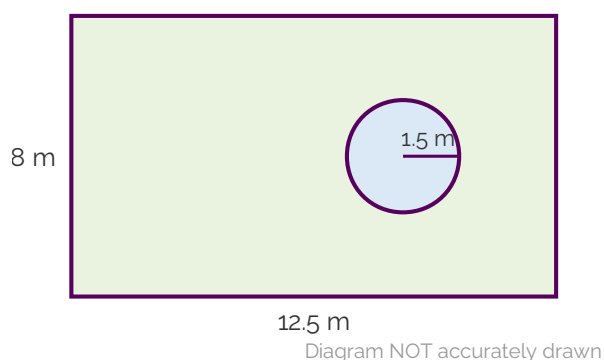
(b) A laptop costs \$820. The price increases by 15%. Work out the new price.

[2]

Answer

(Total for Question 8 is 4 marks)

- 9 The diagram shows a rectangular garden, 12.5 m by 8 m. The garden is grass except for a circular pond of radius 1.5 m.



- (a) Work out the area of the grass. Give your answer correct to 1 decimal place. [3]

Answer

- (b) One box of grass seed covers 20 m^2 . How many boxes are needed to cover all the grass? [2]

Answer

(Total for Question 9 is 5 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Continue the paper (numbering restarts on this sheet). Show your working clearly. Part 2: 38 marks, about 45 minutes.

- 1 A spinner can land on red, blue, green or yellow. The probability of green is the same as the probability of yellow.

Colour	Probability
Red	0.3
Blue	0.25
Green	x
Yellow	x

(a) Work out the value of x . [2]

Answer

(b) The spinner is spun 80 times. Work out an estimate for the number of times it lands on yellow. [2]

Answer

(Total for Question 1 is 4 marks)

2

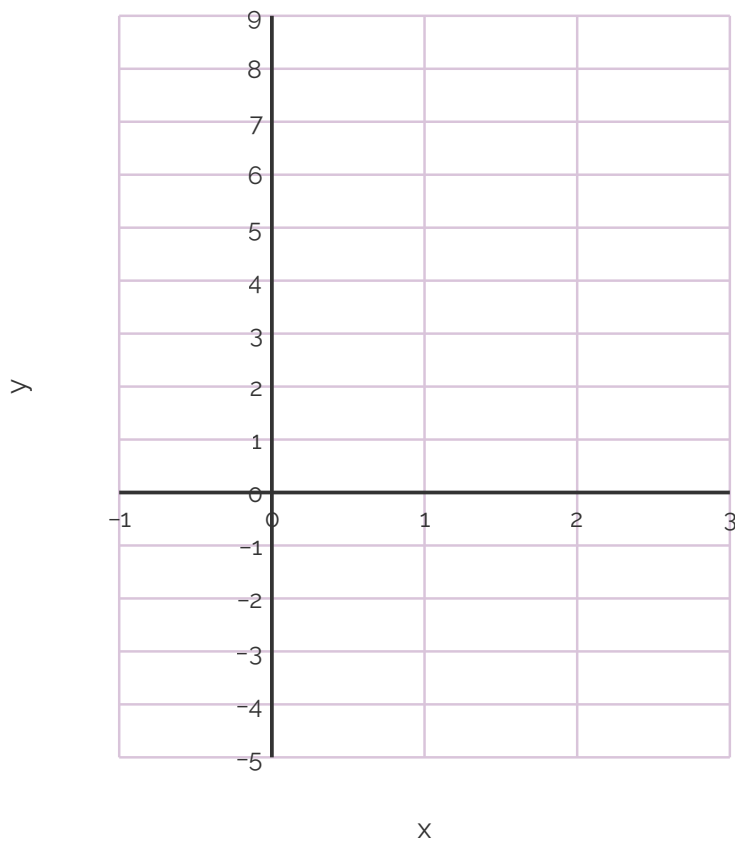
(a) Complete the table of values for $y = 3x - 1$

[2]

x	-1	0	1	2	3
y	-4			5	

(b) On the grid, draw the graph of $y = 3x - 1$ for values of x from -1 to 3

[2]

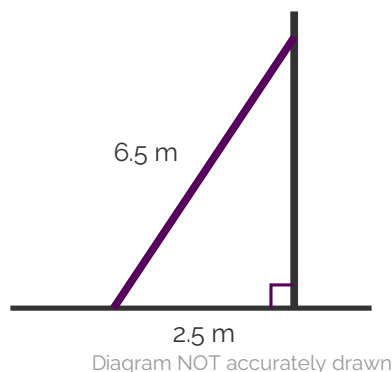


(c) Use your graph to find the value of x when $y = 6.5$

[1]

Answer
(Total for Question 2 is 5 marks)

- 3** A ladder 6.5 m long leans against a vertical wall. The foot of the ladder is on horizontal ground, 2.5 m from the wall.
How far up the wall does the ladder reach? [3]



Answer
(Total for Question 3 is 3 marks)

- 4** (a) Expand $5(3y - 4)$ [1]

Answer

- (b) Expand and simplify $(x + 4)(x + 7)$ [2]

Answer

- (c) Factorise fully $x^2 - 9x + 20$ [2]

Answer
(Total for Question 4 is 5 marks)

- 5 The table shows the number of pets owned by 25 students.

Number of pets	0	1	2	3
Frequency	7	9	6	3

- (a) Work out the mean number of pets.

[3]

Answer

- (b) Find the median number of pets.

[1]

Answer

(Total for Question 5 is 4 marks)

- 6 (a) Solve the inequality $-3 \leq 2x + 1 < 9$

[2]

Answer

- (b) Write down all the integers that satisfy the inequality in part (a).

[1]

Answer

(Total for Question 6 is 3 marks)

- 7 ABC is a right-angled triangle. AC = 15 cm and angle CAB = 38° .
Calculate the length of BC. Give your answer correct to 3 significant figures.

[3]

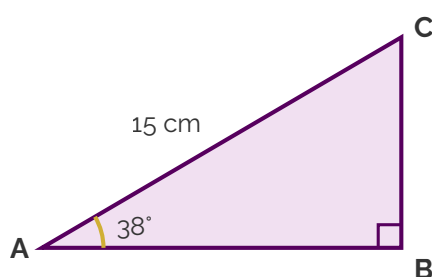


Diagram NOT accurately drawn

Answer

(Total for Question 7 is 3 marks)

- 8 Solve the simultaneous equations

$$3x + 2y = 19$$

$$x - 2y = 1$$

Show clear algebraic working.

[3]

Answer

(Total for Question 8 is 3 marks)

- 9 A cylindrical jug has radius 4 cm and height 15 cm. Work out the volume of the jug. Give your answer correct to 1 decimal place.

[2]

Answer

(Total for Question 9 is 2 marks)

- 10 Kemal invests \$5000 for 3 years at 2.5% per year compound interest. Work out the value of the investment at the end of 3 years.

[3]

Answer

(Total for Question 10 is 3 marks)

- 11 Bus A leaves a bus station every 12 minutes. Bus B leaves the same station every 18 minutes. Both buses leave together at 9 am. When will they next leave together?

[3]

Answer

(Total for Question 11 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Foundation Paper 2F practice paper

I can... complete a Foundation Paper 2F style paper accurately within the time.

Spec ref: Paper 2F · Foundation

Paper 2F is the second Foundation paper. It has the same format as 1F (calculator, 2 hours, 100 marks) but a different mix of questions, including grade 4–5 topics such as trigonometry and simultaneous equations.

Read each question twice and underline what you must find.

Key points

- Real paper: 2 hours, 100 marks, calculator allowed, formulae sheet provided.
- This practice paper: 79 marks — allow about 95 minutes (Part 1 + Part 2).
- Give non-exact answers to 3 significant figures and angles to 1 decimal place unless told otherwise.
- Each paper is worth 50% of the Foundation grade (grades 5–1).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

Key words

work out

show clear algebraic working

describe fully

give a reason

simplest form

use your graph

How marks are awarded

Solve $4(x - 3) = 2x + 9$. Show clear algebraic working. (3 marks)

$$4x - 12 = 2x + 9 \text{ (M1 expanding)}$$

$$2x = 21 \text{ (M1 collecting terms)}$$

$$x = 10.5 \text{ (A1)}$$

Common mistakes

- Mixing up area and perimeter, or radius and diameter.
- Not giving a reason when the question says 'Give a reason'.
- Reflecting in the wrong line, e.g. $x = -1$ instead of $y = -1$.

Exam tip: When the question says 'show clear algebraic working', the calculator can check your answer but cannot replace the working.

Answer ALL questions. You may use a calculator. Show your working clearly. Part 1: 39 marks, about 45 minutes.

- 1 (a) Write down all the factors of 18 [2]

Answer

- (b) Write down a prime number between 30 and 40 [1]

Answer

- (c) Write 84 as a product of its prime factors. [2]

Answer

(Total for Question 1 is 5 marks)

- 2 Here are the ages of 9 people.
23 31 27 23 35 29 40 23 30

- (a) Write down the mode. [1]

Answer

- (b) Find the median. [1]

Answer

- (c) Work out the range. [1]

Answer

- (d) Work out the mean. [2]

Answer

(Total for Question 2 is 5 marks)

- 3 The diagram shows a quadrilateral.
Work out the value of x .

[3]

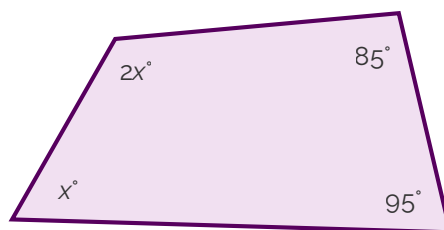


Diagram NOT accurately drawn

Answer

(Total for Question 3 is 3 marks)

- 4 (a) Expand and simplify $3(2a + 5) - 4a$

[2]

Answer

- (b) Factorise $12y - 18$

[1]

Answer

- (c) Solve $(x + 7)/3 = 5$

[2]

Answer

- (d) Make x the subject of $y = 5x - 2$

[2]

Answer

(Total for Question 4 is 7 marks)

- 5 A sports club has 240 members. $\frac{3}{8}$ of the members are juniors. 40% of the other members are seniors. The rest are adults.
How many members are adults?

[4]

Answer

(Total for Question 5 is 4 marks)

- 6 Pack A has 6 bottles of water for \$4.20. Pack B has 10 bottles of the same water for \$6.80. Which pack is the better value? You must show your working. [3]

Answer
(Total for Question 6 is 3 marks)

- 7 A trapezium has parallel sides 7 cm and 12 cm. The perpendicular height is 5 cm. Work out the area of the trapezium. [2]

Answer
(Total for Question 7 is 2 marks)

- 8 Two fair 4-sided spinners are each numbered 1, 2, 3, 4. Both are spun and the scores are added.

- (a) Work out the probability that the total is 5 [2]

Answer

- (b) Work out the probability that the total is greater than 6 [1]

Answer

(Total for Question 8 is 3 marks)

- 9 In a sale, all prices are reduced by 20%. The sale price of a coat is \$68. Work out the original price of the coat. [3]

Answer
(Total for Question 9 is 3 marks)

- 10 (a) Write down the gradient and the y-intercept of the line $y = 4 - 2x$ [2]

Answer

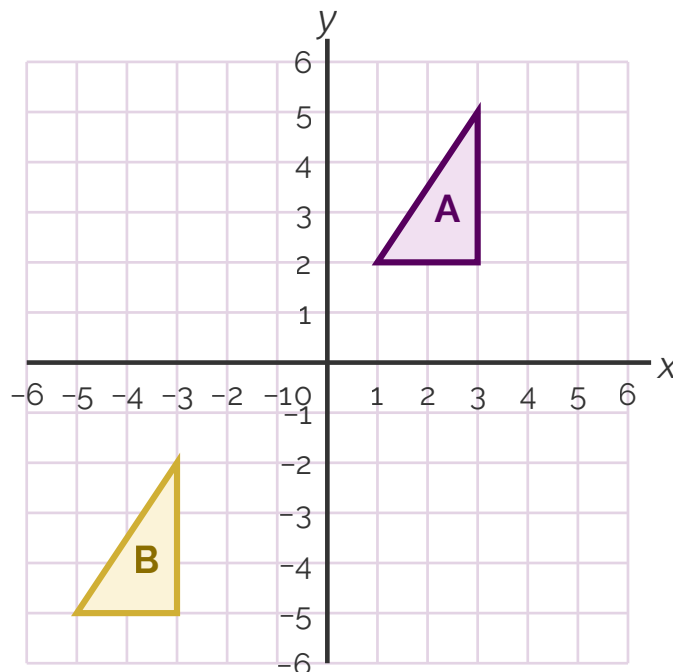
- (b) A straight line passes through (0, 3) and (2, 11). Find the equation of the line. [2]

Answer
(Total for Question 10 is 4 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Continue the paper (numbering restarts on this sheet). Show your working clearly. Part 2: 40 marks, about 50 minutes.

- 1 Triangle A and triangle B are drawn on the grid.



- (a) On the grid, rotate triangle A 180° about the point (0, 0). Label the image C. [2]
(b) On the grid, reflect triangle A in the line $x = -1$. Label the image D. [2]
(c) Describe fully the single transformation that maps triangle A onto triangle B. [2]

Answer
(Total for Question 1 is 6 marks)

- 2 (a) A rectangle measures 12 cm by 9 cm. Work out the length of a diagonal of the rectangle. [3]

Answer

- (b) Work out the angle between the diagonal and the 12 cm side. Give your answer correct to 1 decimal place. [2]

Answer
(Total for Question 2 is 5 marks)

3 Solve $x^2 + 2x - 24 = 0$

[3]

Answer

(Total for Question 3 is 3 marks)

4 The table shows the heights, h cm, of 50 students.

$140 < h \leq 150$	5
$150 < h \leq 160$	12
$160 < h \leq 170$	18
$170 < h \leq 180$	10
$180 < h \leq 190$	5

(a) Write down the modal class.

[1]

Answer

(b) Work out an estimate for the mean height.

[4]

Answer

(Total for Question 4 is 5 marks)

- 5 The diagram shows a triangular prism. The cross-section is a right-angled triangle with sides 5 cm and 12 cm. The prism is 20 cm long.

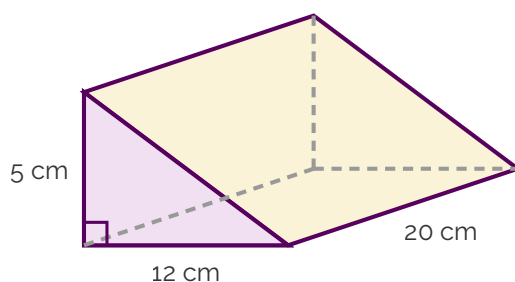


Diagram NOT accurately drawn

- (a) Work out the volume of the prism. [2]

Answer

- (b) Work out the total surface area of the prism. [3]

Answer

(Total for Question 5 is 5 marks)

- 6 A car is worth \$24 000. Its value depreciates by 12% each year.
Work out the value of the car after 4 years. [3]

Answer

(Total for Question 6 is 3 marks)

- 7 (a) Show the inequality $-2 < x \leq 3$ on a number line. [2]

- (b) Solve $7 - 2x > 1$ [2]

Answer

(Total for Question 7 is 4 marks)

- 8 (a) The bearing of B from A is 070° . Work out the bearing of A from B. [1]

Answer

- (b) On a map with scale 1 : 200 000, the distance between two towns is 4.5 cm. Work out the real distance in kilometres. [2]

Answer

(Total for Question 8 is 3 marks)

- 9 Ann, Ben and Cara share \$140. Ben gets twice as much as Ann. Cara gets \$15 more than Ben.

How much does Cara get?

[4]

Answer

(Total for Question 9 is 4 marks)

- 10 The length, L cm, of a pencil is 13 cm, correct to the nearest centimetre.

Write down the error interval for L .

[2]

Answer

(Total for Question 10 is 2 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Higher Paper 1H practice paper

I can... complete a Higher Paper 1H style paper accurately within the time.

Spec ref: Paper 1H · Higher

Paper 1H is one of the two Higher papers. Both are **calculator** papers, 2 hours long, and can test **any** Higher topic.

It starts at about grade 4–5, moves through grade 6–7 topics (trigonometry, histograms, circle theorems) and ends with grade 8–9 questions (proof, vectors, functions, calculus).

Key points

- Real paper: 2 hours, 100 marks, calculator allowed, formulae sheet provided.
- This practice paper: 78 marks — allow about 95 minutes (Part 1 + Part 2).
- Give non-exact answers to 3 significant figures and angles to 1 decimal place unless told otherwise.
- Each paper is worth 50% of the Higher grade (grades 9–4, 3 allowed).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

Key words

show that

prove

give reasons

exact

show clear algebraic working

hence

How marks are awarded

Solve $3x^2 - 4x - 2 = 0$. Give your solutions correct to 3 significant figures. (3 marks)

$$x = (4 \pm \sqrt{(16 + 24)}) \div 6 \text{ (M1 substitution; M1 } \sqrt{40})$$

$$x = \mathbf{1.72} \text{ or } \mathbf{-0.387} \text{ (A1)}$$

Common mistakes

- Using the calculator to guess when the question says 'show clear algebraic working'.
- Rounding before the last step in trigonometry and bounds questions.
- Giving a circle-theorem reason without the key words.

Exam tip: The last questions are short but demanding. A 3-mark proof at the end is worth as much as a 3-mark percentage question at the start.

Answer ALL questions. You may use a calculator. Show your working clearly. Part 1: 41 marks, about 50 minutes.

- 1 (a) Express 120 as a product of its prime factors. [2]

Answer

- (b) Find the highest common factor (HCF) of 84 and 120 [1]

Answer

(Total for Question 1 is 3 marks)

- 2 The value of a house increased by 6% in one year to \$381 600.
Work out the value of the house at the start of the year. [2]

Answer

(Total for Question 2 is 2 marks)

- 3 Solve the simultaneous equations
 $4x + 3y = -1$
 $3x - 2y = 12$
 Show clear algebraic working. [3]

Answer

(Total for Question 3 is 3 marks)

- 4 ABC is a right-angled triangle. $AB = 9.5$ cm and $BC = 7.2$ cm.
Calculate the size of angle BAC. Give your answer correct to 1 decimal place. [2]

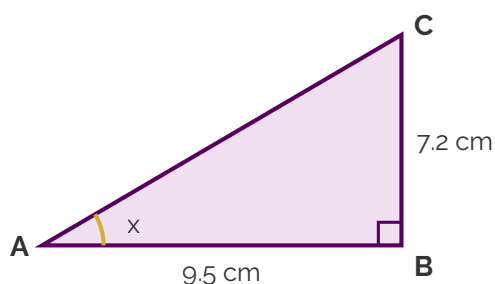


Diagram NOT accurately drawn

Answer
(Total for Question 4 is 2 marks)

- 5 The length of a rectangle is 12.4 cm and the width is 7.5 cm, both correct to 1 decimal place.
Calculate the upper bound for the area of the rectangle. Show your working clearly. [3]

Answer
(Total for Question 5 is 3 marks)

- 6 Expand and simplify $(2x + 3)(x - 4)(x + 1)$ [3]

Answer
(Total for Question 6 is 3 marks)

- 7 Solve $2x^2 + 3x - 7 = 0$. Give your solutions correct to 3 significant figures. [3]

Answer
(Total for Question 7 is 3 marks)

- 8 P, Q and T are points on the circle, centre O. AB is the tangent to the circle at T. Angle QTB = 68° .

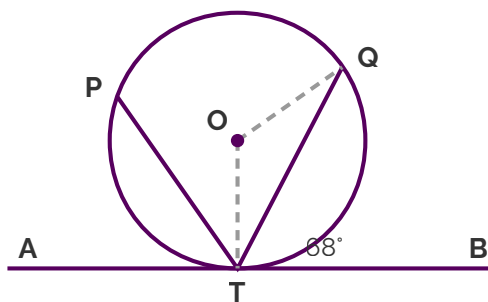


Diagram NOT accurately drawn

- (a)(i) Write down the size of angle OTB. [1]

Answer

- (a)(ii) Work out the size of angle TOQ. Give reasons for your answer. [3]

Answer

- (b) Work out the size of angle TPQ. Give a reason for your answer. [2]

Answer

(Total for Question 8 is 6 marks)

- 9 The table gives information about the times, t seconds, taken by 75 people to solve a puzzle.

$0 < t \leq 20$	12
$20 < t \leq 30$	18
$30 < t \leq 35$	15
$35 < t \leq 50$	21
$50 < t \leq 80$	9

- (a) Work out the frequency densities needed to draw a histogram. [2]

Answer

- (b) Work out an estimate for the number of people who took more than 40 seconds. [2]

Answer

(Total for Question 9 is 4 marks)

- 10 In triangle PQR, $PQ = 8.6$ cm, $PR = 11.3$ cm and angle $QPR = 47^\circ$.

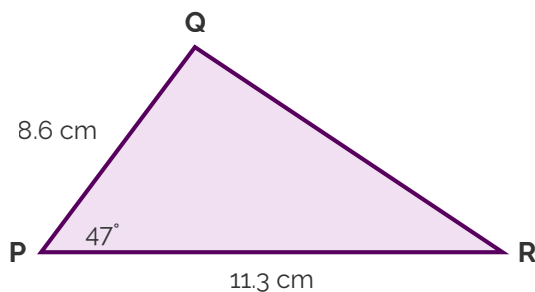


Diagram NOT accurately drawn

- (a) Calculate the length of QR. Give your answer correct to 3 significant figures. [3]

Answer

- (b) Calculate the area of triangle PQR. [2]

Answer

(Total for Question 10 is 5 marks)

11**(a)** Simplify fully $(x^2 - 16)/(2x^2 + 9x + 4)$ **[3]****Answer****(b)** Solve $3/(x + 1) + 2/(x - 2) = 1$. Give your solutions correct to 3 significant figures.**[4]****Answer****(Total for Question 11 is 7 marks)**

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Continue the paper (numbering restarts on this sheet). Show your working clearly. Part 2: 37 marks, about 45 minutes.

- 1 Simplify $\sqrt{75} - \sqrt{12}$

[2]

Answer

(Total for Question 1 is 2 marks)

- 2 $f(x) = 3x + 2$ $g(x) = x^2$

- (a) Find $fg(-2)$

[2]

Answer

- (b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

[2]

Answer

- (c) Solve $gf(x) = 4$

[3]

Answer

(Total for Question 2 is 7 marks)

- 3 A particle moves in a straight line. Its displacement, s metres, from a fixed point O at time t seconds is $s = t^3 - 6t^2 + 9t$

- (a) Find an expression for the velocity, v m/s, at time t .

[2]

Answer

- (b) Find the times when the particle is instantaneously at rest.

[2]

Answer

(Total for Question 3 is 4 marks)

- 4 A drawer contains 5 black socks and 7 white socks. Hana takes two socks at random without replacement.

Work out the probability that the two socks are different colours.

[3]

Answer

(Total for Question 4 is 3 marks)

- 5 OAB is a triangle. $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$. M is the midpoint of AB. N is the point on OB such that $ON : NB = 1 : 3$.

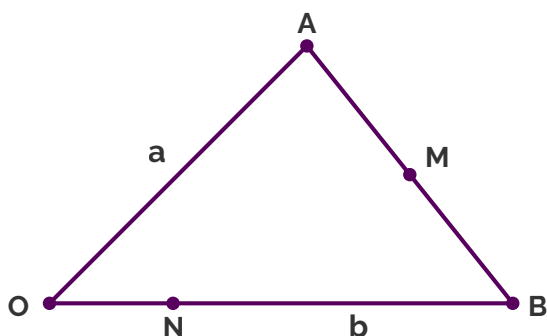


Diagram NOT accurately drawn

- (a) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, the vector $\mathbf{NM}$. Give your answer in its simplest form.

[3]

Answer

- (b) The point P is such that $\mathbf{OP} = \mathbf{a} + \frac{3}{4}\mathbf{b}$. Show that N, M and P lie on a straight line.

[3]

Answer

(Total for Question 5 is 6 marks)

- 6 The curve with equation $y = f(x)$ has a minimum point at $(3, -4)$.

- (a) Write down the coordinates of the minimum point of the curve with equation $y = f(x - 2)$

[1]

Answer

- (b) Write down the coordinates of the minimum point of $y = f(x) + 6$

[1]

Answer

- (c) Write down the coordinates of the maximum point of $y = -f(x)$

[1]

Answer

(Total for Question 6 is 3 marks)

- 7 Solve the inequality $x^2 - x - 12 \leq 0$

[3]

Answer

(Total for Question 7 is 3 marks)

- 8 Use algebra to show that the recurring decimal 0.236 (= 0.2363636...) can be written as $\frac{13}{55}$

[3]

Answer

(Total for Question 8 is 3 marks)

- 9 Prove algebraically that $(2n + 1)^2 - (2n - 1)^2$ is always a multiple of 8 for all positive integers n .

[3]

Answer

(Total for Question 9 is 3 marks)

- 10 A curve has equation $y = x^2 + 16/x$. Find the coordinates of the turning point of the curve. [3]

Answer

(Total for Question 10 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Higher Paper 2H practice paper

I can... complete a Higher Paper 2H style paper accurately within the time.

Spec ref: Paper 2H · Higher

Paper 2H is the second Higher paper. It has the same format as 1H but different content, often with more statistics, graphs and multi-step geometry.

Higher questions often combine topics: a quadratic from an area, a bound from a speed, a probability from a Venn diagram.

Key points

- Real paper: 2 hours, 100 marks, calculator allowed, formulae sheet provided.
- This practice paper: 79 marks — allow about 95 minutes (Part 1 + Part 2).
- Give non-exact answers to 3 significant figures and angles to 1 decimal place unless told otherwise.
- Each paper is worth 50% of the Higher grade (grades 9–4, 3 allowed).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

Key words

calculate
show that
estimate
set notation
give reasons
suitable degree of accuracy

How marks are awarded

Prove algebraically that $(n + 3)^2 - (n - 3)^2$ is a multiple of 12 for all integers n . (3 marks)

$$n^2 + 6n + 9 - (n^2 - 6n + 9) \text{ (M1)}$$

$$= 12n \text{ (A1)}$$

$$12n = 12 \times n, \text{ so it is a multiple of 12 (C1 conclusion)}$$

Common mistakes

- Forgetting that a histogram shows frequency **density**, not frequency.
- Losing a sign when rearranging formulae with the subject on both sides.
- Giving only one solution of a trigonometric equation in $0^\circ \leq x \leq 360^\circ$.

Exam tip: In 'show that' and proof questions, finish with a clear conclusion that matches the question.

Answer ALL questions. You may use a calculator. Show your working clearly. Part 1: 39 marks, about 45 minutes.

- 1 The population of a town is 48 000. It is expected to increase by 3.5% each year.

(a) Work out the expected population after 4 years. Give your answer to the nearest whole number. [2]

Answer

(b) After how many complete years will the population first be more than 60 000? [2]

Answer

(Total for Question 1 is 4 marks)

- 2 A wheelchair ramp rises 0.9 m. The ramp makes an angle of 4.8° with the horizontal ground.

(a) Calculate the length of the sloping surface of the ramp. [3]

Answer

(b) Calculate the horizontal distance covered by the ramp. [2]

Answer

(Total for Question 2 is 5 marks)

- 3 (a) **a** and **b** are the column vectors shown. Find $2\mathbf{a} + 3\mathbf{b}$ as a column vector. [1]

$$\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$$

Answer

(b) Find $|2\mathbf{a} + 3\mathbf{b}|$. Give your answer correct to 3 significant figures. [2]

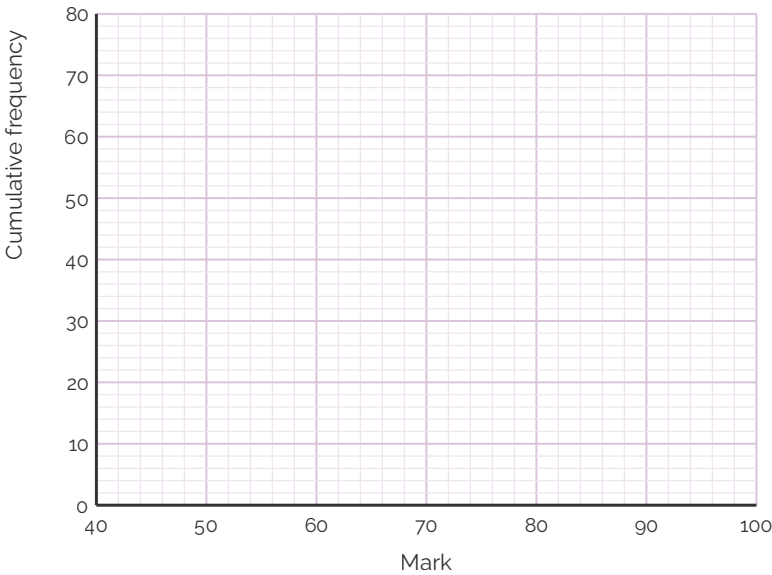
Answer

(Total for Question 3 is 3 marks)

4

The table shows information about the marks of 80 students in a test.

Mark (m)	Frequency
$40 < m \leq 50$	6
$50 < m \leq 60$	15
$60 < m \leq 70$	28
$70 < m \leq 80$	21
$80 < m \leq 90$	7
$90 < m \leq 100$	3



- (a)

On the grid, draw a cumulative frequency graph.

[3]
- (b)

Use your graph to find an estimate for the median mark.

[1]
- Answer
- (c)

Use your graph to find an estimate for the interquartile range.

[2]

Answer
(Total for Question 4 is 6 marks)

5

Make a the subject of the formula $3(a + 2b) = ac + 4$

[4]

Answer
(Total for Question 5 is 4 marks)

6

(a) The line L has equation $3y = 2x - 6$. Find the gradient of L.

[1]

Answer

(b) Find an equation of the line perpendicular to L that passes through the point (4, 1).

[3]

Answer

(Total for Question 6 is 4 marks)

7

OAB is a sector of a circle, centre O, radius 8 cm. Angle AOB = 75° .

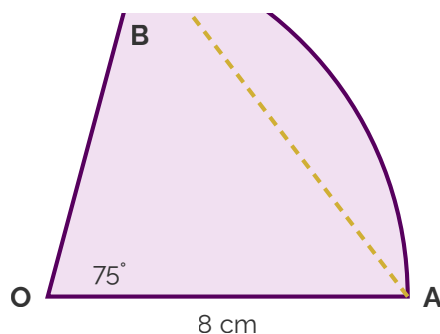


Diagram NOT accurately drawn

(a) Calculate the arc length AB.

[2]

Answer

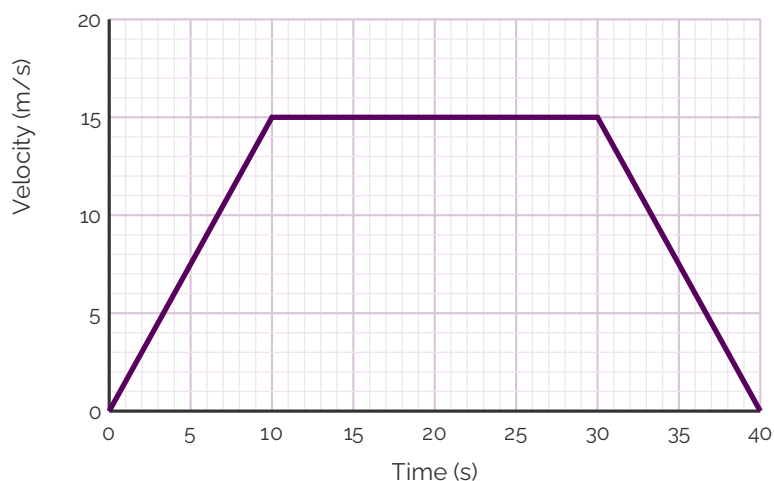
(b) Calculate the area of the segment between the chord AB and the arc AB.

[3]

Answer

(Total for Question 7 is 5 marks)

- 8 The velocity–time graph shows a car's journey of 40 seconds.



- (a) Work out the acceleration of the car during the first 10 seconds. [2]

Answer

- (b) Work out the total distance travelled by the car. [3]

Answer

(Total for Question 8 is 5 marks)

- 9 Write $\frac{2}{x+3} + \frac{5}{x-1}$ as a single fraction in its simplest form. [3]

Answer

(Total for Question 9 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Continue the paper (numbering restarts on this sheet). Show your working clearly. Part 2: 40 marks, about 50 minutes.

- 1 Solve the simultaneous equations

$$y = 2x + 1$$

$$x^2 + y^2 = 10$$

Show clear algebraic working.

[5]

Answer

(Total for Question 1 is 5 marks)

- 2 $f(x) = (2x + 1)/(x - 3)$, $x \neq 3$

Find $f^{-1}(x)$.

[3]

Answer

(Total for Question 2 is 3 marks)

- 3 There are 60 students in a club. 35 play chess (C), 28 play draughts (D) and 9 play neither.

(a) How many students play both chess and draughts?

[2]

Answer

(b) A student who plays draughts is chosen at random. Find the probability that this student also plays chess.

[1]

Answer

(Total for Question 3 is 3 marks)

- 4 A curve has equation $y = 2x^2 - 5x + 3$

(a) Find the gradient of the curve at the point (2, 1). [2]

Answer

(b) Find the equation of the tangent to the curve at the point (2, 1). [2]

Answer

(c) Find the coordinates of the turning point of the curve. [2]

Answer

(Total for Question 4 is 6 marks)

- 5 ABCD is a cyclic quadrilateral. Angle $ABC = (3x + 10)^\circ$ and angle $ADC = (2x - 5)^\circ$.
Work out the value of x . Give a reason for your answer. [3]

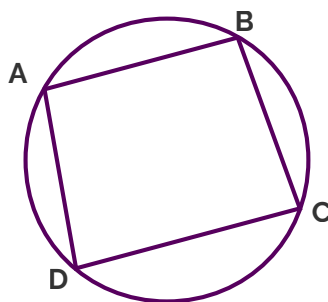


Diagram NOT accurately drawn

Answer

(Total for Question 5 is 3 marks)

- 6 A frustum is made by removing a small cone from a large cone. The large cone has base radius 6 cm and height 12 cm. The small cone removed has base radius 2 cm and height 4 cm.

Calculate the volume of the frustum. Give your answer correct to 3 significant figures. [4]

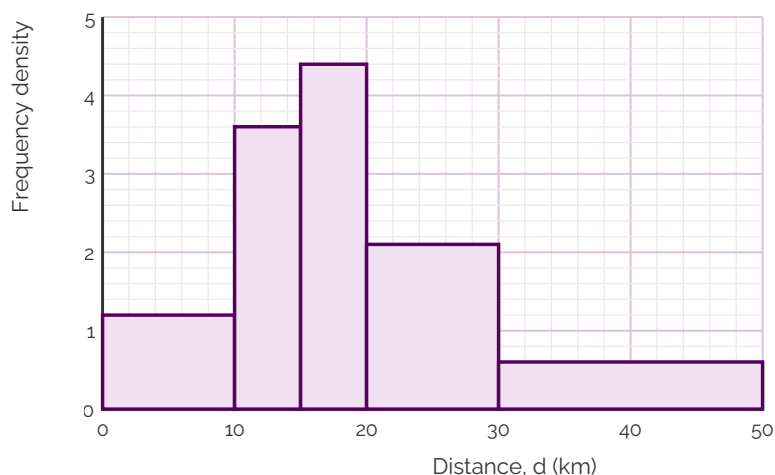
Answer

(Total for Question 6 is 4 marks)

- 7 In triangle ABC, $AB = 1.5 \times AC$ and angle $BAC = 38^\circ$. The area of the triangle is 45 cm^2 . Find the length of AC. Give your answer correct to 3 significant figures. [3]

Answer
(Total for Question 7 is 3 marks)

- 8 The histogram shows information about the distances, d km, some people travel to work.



- (a) Work out the number of people who travel more than 15 km but not more than 20 km. [2]

Answer

- (b) Work out the total number of people shown in the histogram. [2]

Answer
(Total for Question 8 is 4 marks)

- 9 Show that $2x^2 - 12x + 23 > 0$ for all values of x . [3]

Answer
(Total for Question 9 is 3 marks)

- 10** $a = 12.9$ and $b = 5.3$, both correct to 1 decimal place. $c = 4$, correct to the nearest whole number.

Work out the lower bound for the value of $(a - b)/c$. Show your working clearly.

[3]

Answer

(Total for Question 10 is 3 marks)

- 11** Find an expression for the n th term of the quadratic sequence 4, 11, 22, 37, 56, ...

[3]

Answer

(Total for Question 11 is 3 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Mixed problem solving

I can... choose and combine methods from different topics to solve unfamiliar, multi-step problems.

Spec ref: Papers 1F, 2F, 1H, 2H · Foundation & Higher

The longer questions on every 4MA1 paper are problem-solving questions. They do not tell you which topic to use, and they often need two or three topics together.

Write down what you know and what you need. Then work forwards one step at a time and label each value you find.

Key points

- Read the whole question, then underline the numbers and the final thing you must find.
- Draw a sketch or a table if there is no diagram.
- Label each step: 'cost of 1 can = ...', 'volume of tank = ...'.
- Check the size of the answer and the units: is it sensible?
- If you are stuck, write down any relevant fact or formula — it may earn a mark.

Key words

multi-step

plan

check

reasonable answer

context

units

Worked example

A rectangle is 3 times as long as it is wide. Its perimeter is 48 cm. Work out its area.

Width w , length $3w$: $2(w + 3w) = 8w = 48$, so $w = 6$ cm

Length = 18 cm, so area = $6 \times 18 = 108 \text{ cm}^2$

Common mistakes

- Stopping after the first step: finding the width but not the area.
- Mixing units (cm and m, minutes and hours) in one calculation.
- Not answering the final question, e.g. giving a total instead of the change.

Exam tip: Problem-solving questions are often worth 4–6 marks. Even if you cannot finish, every correct step can score.

Show your working in the space. You may use a calculator.

- 1 A rectangle is 3 times as long as it is wide. Its perimeter is 48 cm. Find its area.

- 2 Four consecutive even numbers add up to 92. Find the smallest.

- 3 After a 12% increase a price is \$67.20. Find the original price.

- 4 Red : blue = 3 : 8. There are 40 more blue counters than red. How many are red?

- 5 A cuboid is 5 cm by 4 cm by h cm. Its volume is 150 cm^3 . Find h .

- 6 A phone plan costs \$18 a month plus \$0.05 per text. Ella sends 260 texts. Find the monthly cost.

- 7 The mean of six numbers is 11. The number 21 is removed. Find the new mean.

- 8 Each exterior angle of a regular polygon is 24° . How many sides does it have?

- 9 A circle has area 50.24 cm^2 . Taking $\pi = 3.14$, find its radius.

- 10 Two lights flash every 15 s and every 20 s. They flash together now. When do they next flash together?

- 11 A map has scale 1 : 50 000. Two towns are 3.6 cm apart on the map. Find the real distance in km.

- 12 Change 15 m/s into km/h.

- 13 A machine worth \$4000 loses 10% of its value each year. Find its value after 2 years.

- 14 $x + y = 17$ and $x - y = 5$. Find the value of xy .

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure

Answer ALL questions. You may use a calculator. Show your working clearly.

- 1** A restaurant bill is \$64. Tax of 7% is added to the bill. A tip of 10% of the new total is then added.

Work out the total amount paid.

[3]

Answer
(Total for Question 1 is 3 marks)

- 2** Cups are sold in packs of 12. Plates are sold in packs of 18. Jo wants exactly the same number of cups and plates.

What is the least number of packs of cups and packs of plates she must buy?

[3]

Answer
(Total for Question 2 is 3 marks)

- 3** An alloy is made by mixing 300 cm^3 of metal A with 200 cm^3 of metal B. The density of metal A is 8.9 g/cm^3 and the density of metal B is 2.7 g/cm^3 .

Work out the density of the alloy.

[4]

Answer
(Total for Question 3 is 4 marks)

- 4** A 750 g jar of honey costs \$6.30. A 1.2 kg jar of the same honey costs \$9.84.

Which jar is better value for money? You must show your working.

[3]

Answer
(Total for Question 4 is 3 marks)

- 5 Class A has 24 students. Their mean test mark is 68. Class B has 28 students. Their mean test mark is 75.

Work out the mean mark of all 52 students. Give your answer correct to 1 decimal place. [3]

Answer

(Total for Question 5 is 3 marks)

- 6 A water tank can be emptied by 4 identical pumps in 9 hours.
How long would it take 6 of these pumps to empty the tank? [2]

Answer

(Total for Question 6 is 2 marks)

- 7 A rectangle has length $(x + 3)$ cm and width $(2x - 1)$ cm. Its area is 40 cm^2 .

(a) Show that $2x^2 + 5x - 43 = 0$ [2]

Answer

(b) Solve $2x^2 + 5x - 43 = 0$ to find the width of the rectangle. Give your answer correct to 3 significant figures. [3]

Answer

(Total for Question 7 is 5 marks)

- 8 An ice cream is modelled as a hemisphere of radius 3.5 cm on top of a cone of radius 3.5 cm and height 11 cm.

Calculate the total volume. Give your answer correct to 3 significant figures. [3]

Answer

(Total for Question 8 is 3 marks)

- 9** A field is a rectangle. Its length is 85 m, correct to the nearest metre, and its width is 42 m, correct to the nearest metre. A path of width 2 m (exact) is removed from the length. Work out the lower bound for $(\text{length} - 2) \times \text{width}$. **[3]**

Answer
(Total for Question 9 is 3 marks)

- 10** Mia saves \$5 in week 1, \$7 in week 2, \$9 in week 3, and so on, increasing by \$2 each week.

(a) Work out the total amount she saves in the first 20 weeks. **[2]**

Answer

(b) In which week does her total savings first exceed \$1000? **[3]**

Answer
(Total for Question 10 is 5 marks)

Reflect: ☐ Red — not yet ☐ Amber — nearly ☐ Green — secure



CHECK

End-of-book check

End-of-book check

Name _____ Date _____ Score _____ / 14

Check what you have learnt. Use a calculator. Give non-exact answers to 3 significant figures.

1 Round 12.0496 to 3 significant figures.

2 Work out $2\frac{1}{4} \div \frac{3}{8}$.

3 Write 0.000 093 in standard form.

4 Solve $(x - 3)/4 = 5$.

5 Increase \$240 by 7.5%.

6 Factorise $x^2 + 3x - 28$.

7 Find the area of a circle with diameter 10 cm.

8 Find one interior angle of a regular 12-sided polygon.

9 A fair dice is thrown 60 times. How many sixes would you expect?

10 Find the mean of 12, 15, 9, 20, 14.

11 Write down the gradient of the line $y = 5 - 3x$.

12 $\tan x = 8/5$. Find x to 1 decimal place.

13 Simplify $x^8 \div x^3 \times x^2$.

14 Make r the subject of $A = 4\pi r^2$.



FOR TEACHERS & PARENTS

Answers & mark schemes

Mark schemes list the points that earn marks. Accept equivalent answers and follow-through where working is correct. M = method mark, A = accuracy mark, B = independent mark.

Starting point check

- 1 0.006 39
- 2 $25/24 = 1\frac{1}{24}$
- 3 4.7×10^4
- 4 $x = -4$
- 5 \$123
- 6 $x^2 + 2x - 24$
- 7 28 cm^2
- 8 36°
- 9 0.45
- 10 16
- 11 (5, 3)
- 12 25 cm
- 13 $27a^6$
- 14 75.5°

Unit 1 · Sheet A — Exam technique and command words

- 1 Show clear algebraic working
- 2 angles on a straight line add up to 180°
- 3 7.10
- 4 0.030
- 5 865 000
- 6 4.00
- 7 128.4°
- 8 \$7.50
- 9 0
- 10 or equivalent
- 11 $\sqrt{2}$
- 12 $3/4$
- 13 2 h 24 min
- 14 $x = 8$ or $x = -8$
- 15 6 minutes
- 16 0.0456
- 17 3 000 000 cm^3

Unit 1 · Sheet B — Exam technique and command words

- 1 (a) pentagon split into 3 triangles, or $(5 - 2) \times 180$ M1; $3 \times 180 = 540$ A1 [2] (b) 108° B1 [1]
- 2 (a) he divided by 4; there are 5 numbers, so divide by 5 B1 [1] (b) 8 B1 [1] (c) $6 \times 9 = 54$ M1; $54 - 40 = 14$ A1 [2]
- 3 $3 \times 34 (= 102)$ and $5 \times 21 (= 105)$ M1; $102 + 105 + 12 (= 219)$ M1; \$31 A1 [3]
- 4 $6x + 15 - 2x + 2$ M1 (both brackets expanded, sign of +2 correct); $= 4x + 17$ A1 [2]
- 5 (a) $4/3 \times \pi \times 4.8^3$ M1; 463 cm^3 (463.25...) A1 [2] (b) 500 B1ft [1]
- 6 Shop A: pays for 6 cans M1, $6 \times 1.20 = \$7.20$; Shop B: $9 \times 1.25 \times 0.7$ M1 = \$7.875 (= \$7.88) A1; Shop A, cheaper by \$0.68 (accept \$0.67 or \$0.68) A1 [4]
- 7 $6 \times 40 \div 0.5$ M1; 480 A1 [2]
- 8 $(180 - 46) \div 2$ M1; 67° A1; base angles of an isosceles triangle are equal / angles in a triangle add up to 180° B1 [3]
- 9 240×85 M1; 20 400 cm^2 A1 [2]

Unit 2 · Sheet A — Calculator skills

- 1 4.05
- 2 13.5
- 3 27.3
- 4 2.05
- 5 0.682
- 6 5.00
- 7 32.6°
- 8 33.3
- 9 431
- 10 9499.17
- 11 31.6
- 12 3.77
- 13 1.62×10^3
- 14 4×10^8
- 15 0.64
- 16 2 h 39 min
- 17 0.000 60
- 18 \$73.60

Unit 2 · Sheet B — Calculator skills

- 1** (a) 1.9998767... B2 (B1 for 10.919... or 5.46 seen) [2] (b) 2.0 B1ft (not 2) [1]
2 (a) $13.6 \times \cos 41$ M1; 10.3 A1 [2] (b) $\tan^{-1}(7.8 \div 11.5)$ M1; 34.1 A1 [2]
3 (a) $21\,000 \times 0.91^4$ M1; \$14 401 A1 [2] (b) trials, e.g. $n = 5$ gives 13105, $n = 6$ gives 11925 M1; 6 A1 [2]
4 (a) $\pi \times 6.5^2 \times 14$ M1; 1860 cm³ A1 [2] (b) $2 \times \pi \times 6.5 \times 14$ M1; $2 \times \pi \times 6.5^2$ M1; 837 cm² A1 [3]
5 (a) $1.5 \times 10^{11} \div 3 \times 10^8$ M1; 500 s A1 [2] (b) 8.33 min (8 min 20 s) B1ft [1]
6 115 seen M1; $86.25 \div 1.15$ M1; \$75 A1 [3]
7 3 h 24 min = 3.4 h B1; $255 \div 3.4$ M1; 75 km/h A1 [3]

Unit 3 · Sheet A — Accuracy, estimation and bounds

- 1** 5.65
2 0.000 74
3 8.9
4 30
5 200
6 30
7 $35 \leq x < 45$
8 6.25
9 252.5 g
10 $4.65 \leq t < 4.75$
11 $3.4 \leq n < 3.5$
12 12
13 4
14 3.57
15 20.25 cm²
16 3500

Unit 3 · Sheet B — Accuracy, estimation and bounds

- 1** (a) $5 \times 20 \div 0.2$ M1; 500 A1 [2] (b) 524 B1 [1]
2 (a) 12.45 and 8.15 seen M1; 41.2 cm A1 [2] (b) 12.55×8.25 M1; 103.5375 cm² (accept 104) A1 [2]
3 (a) 200.5 and 24.75 seen B1; $200.5 \div 24.75$ M1; 8.10 m/s A1 [3] (b) lower bound $199.5 \div 24.85 = 8.028$ M1; both bounds round to 8 (1 s.f.), so 8 m/s A1 [2]
4 $6.2 \leq x < 6.3$ B2 (B1 for 6.2 and 6.3 with wrong inequalities) [2]
5 645 and 5.45 seen B1; $5.45^3 (= 161.87...)$ M1; $645 \div 161.87...$ M1; 3.98 g/cm³ A1 [4]
6 3.65 and 0.475 seen B1; $3.65 \div 0.475$ M1; 7.68 A1 [3]
7 3.9 has 2 s.f.; to 1 s.f. it is 4 B1 [1]
8 (a) 8.7996697... B2 (B1 for 71.9989... or 8.182 seen) [2] (b) 8.80 B1ft [1]

Unit 4 · Sheet A — Foundation Paper 1F practice paper

- 1** (a) $3/8$ B1 [1] (b) 20% B1 [1] (c) 45° — M1 $5/40 \times 360$; A1 [2]
2 \$1.00 — M1 for two of 2×2.40 , 4.75, 3×3.15 ; M1 20 — their total (\$19.00); A1 [3]
3 (a) 125 B1 [1] (b) 14 B1 [1] (c) 4.19921875 — M1 10.75 or 2.56 seen; A1 [2] (d) 4.2 B1 ft [1]
4 (a) $5m$ B1 [1] (b) $12ab$ B1 [1] (c) $x = 7$ — M1 $5x = 35$; A1 [2] (d) -7 — M1 $3 \times -4 + 5$; A1 [2]
5 (a) 57° B1 [1] (b) 123° B1; the exterior angle of a triangle equals the sum of the interior opposite angles (or angles on a straight line add up to 180°) B1 [2]
6 (a) 25 — M1 $35 \div 7 (= 5)$; A1 [2] (b) 15 — M1 $6 \div 2 \times 5$; A1 [2]
7 (a) 32, 39 B1 [1] (b) $7n - 3$ B2 (B1 for $7n + k$) [2] (c) No — M1 $7n - 3 = 100$ or $7n = 103$; C1 $n = 14.7...$ is not a whole number (or 95 and 102 are terms) [2]
8 (a) 91 — M1 0.35×260 ; A1 [2] (b) \$943.00 — M1 820×1.15 or $820 + 123$; A1 [2]
9 (a) 92.9 m² — M1 $12.5 \times 8 (= 100)$; M1 $\pi \times 1.5^2 (= 7.068...)$; A1 [3] (b) 5 — M1 their area $\div 20$; A1 ft (rounded up) [2]

Unit 4 · Sheet B — Foundation Paper 1F practice paper

- 1** (a) 0.225 — M1 $(1 - 0.3 - 0.25) \div 2$; A1 [2] (b) 18 — M1 $80 \times$ their x ; A1 ft [2]
2 (a) -1, 2, 8 B2 (B1 for two correct) [2] (b) Correct straight line from (-1, -4) to (3, 8) B2 ft (B1 for at least 3 correct points plotted) [2] (c) 2.5 B1 ft [1]
3 6 m — M1 $6.5^2 - 2.5^2$; M1 $\sqrt{(42.25 - 6.25)}$; A1 [3]
4 (a) $15y - 20$ B1 [1] (b) $x^2 + 11x + 28$ — M1 three of four terms correct; A1 [2] (c) $(x - 4)(x - 5)$ B2 (B1 for $(x \pm 4)(x \pm 5)$) [2]
5 (a) 1.2 — M1 $\Sigma fx (= 30)$; M1 $\div 25$; A1 [3] (b) 1 B1 [1]
6 (a) $-2 \leq x < 4$ — M1 $-4 \leq 2x < 8$; A1 [2] (b) -2, -1, 0, 1, 2, 3 B1 ft [1]
7 9.23 cm — M1 $\sin 38 = BC/15$; M1 $15 \times \sin 38$; A1 [3]
8 $x = 5$, $y = 2$ — M1 correct method to eliminate one variable (e.g. $4x = 20$); A1 $x = 5$; A1 $y = 2$ [3]
9 754.0 cm³ — M1 $\pi \times 4^2 \times 15$; A1 [2]
10 \$5,384.45 — M1 5000×1.025 ; M1 5000×1.025^3 ; A1 [3]
11 9.36 am — M1 lists of multiples or LCM method; A1 LCM = 36; A1 [3]

Unit 5 · Sheet A — Foundation Paper 2F practice paper

- 1** (a) 1, 2, 3, 6, 9, 18 B2 (B1 for at least 4 correct with none wrong) [2] (b) 31 or 37 B1 [1] (c) $2^2 \times 3 \times 7$ (or $2 \times 2 \times 3 \times 7$) — M1 a correct method; A1 [2]
- 2** (a) 23 B1 [1] (b) 29 B1 [1] (c) 17 B1 [1] (d) $29 - M1\ 261 \div 9$; A1 [2]
- 3** $60 - M1\ x + 2x + 95 + 85 = 360$; $M1\ 3x = 180$; A1 [3]
- 4** (a) $2a + 15 - M1\ 6a + 15$; A1 [2] (b) $6(2y - 3)$ B1 [1] (c) $x = 8 - M1\ x + 7 = 15$; A1 [2] (d) $x = (y + 2)/5 - M1\ 5x = y + 2$; A1 [2]
- 5** $90 - P1\ 240 \times 3/8 (= 90)$; $P1\ 240 - 90 (= 150)$; $P1\ 0.4 \times 150 (= 60)$; A1 [4]
- 6** Pack B — $M1\ 4.20 \div 6 (= 0.70)$ or $6.80 \div 10 (= 0.68)$ or equivalent comparison; M1 both; C1 Pack B with correct figures [3]
- 7** $47.5\text{ cm}^2 - M1\ 1/2(7 + 12) \times 5$; A1 [2]
- 8** (a) $4/16 = 1/4 - M1\ a\ sample\ space\ or\ listing\ (1,4), (2,3), (3,2), (4,1)$; A1 [2] (b) $3/16$ B1 [1]
- 9** $\$85 - M1\ 68 \div 0.8\ or\ 80\% = 68$; M1 complete method; A1 [3]
- 10** (a) gradient -2 B1; intercept 4 (0, 4) B1 [2] (b) $y = 4x + 3 - M1\ gradient\ (11 - 3)/2 = 4$; A1 [2]

Unit 5 · Sheet B — Foundation Paper 2F practice paper

- 1** (a) Vertices $(-1, -2), (-3, -2), (-3, -5)$ B2 (B1 for a rotation of 180° about another point, or 90°) [2] (b) Vertices $(-3, 2), (-5, 2), (-5, 5)$ B2 (B1 for a reflection in another vertical line) [2] (c) Translation B1; by the column vector with top -6 and bottom -7 B1 [2]
- 2** (a) $15\text{ cm} - M1\ 12^2 + 9^2$; $M1\ \sqrt{225}$; A1 [3] (b) $36.9^\circ - M1\ \tan^{-1}(9/12)$; A1 [2]
- 3** $x = 4, x = -6 - M1\ (x + 6)(x - 4)$; A1 A1 (or A1 for both) [3]
- 4** (a) $160 < h \leq 170$ B1 [1] (b) $164.6\text{ cm} - M1\ midpoints$; $M1\ \Sigma fx (= 8230)$; $M1\ \div 50$; A1 [4]
- 5** (a) $600\text{ cm}^3 - M1\ 1/2 \times 5 \times 12 \times 20$; A1 [2] (b) $660\text{ cm}^2 - P1\ hypotenuse\ 13\text{ cm}$; $P1\ 2 \times 30 + (5 + 12 + 13) \times 20$ or areas of all 5 faces; A1 [3]
- 6** $\$14,392.69 - M1\ 24\ 000 \times 0.88$; $M1\ 24\ 000 \times 0.88^4$; A1 [3]
- 7** (a) Open circle at -2 , closed circle at 3 , joined B2 (B1 for one end correct) [2] (b) $x < 3 - M1\ -2x > -6$ or $6 > 2x$; A1 [2]
- 8** (a) 250° B1 [1] (b) $9\text{ km} - M1\ 4.5 \times 200\ 000 (= 900\ 000\text{ cm})$; A1 [2]
- 9** $\$65 - P1\ x + 2x + (2x + 15) = 140$; $P1\ 5x = 125$; $P1\ x = 25$; A1 [4]
- 10** $12.5 \leq L < 13.5$ B2 (B1 for one bound correct) [2]

Unit 6 · Sheet A — Higher Paper 1H practice paper

- 1** (a) $2^3 \times 3 \times 5 - M1\ correct\ method$; A1 [2] (b) $12\ B1\ [1]$
- 2** $\$360,000.00 - M1\ 381\ 600 \div 1.06$; A1 [2]
- 3** $x = 2, y = -3 - M1\ correct\ method\ to\ eliminate\ one\ variable\ (e.g.\ 8x + 6y = -2\ and\ 9x - 6y = 36)$; $A1\ x = 2$; $A1\ y = -3$ [3]
- 4** $37.2^\circ - M1\ \tan x = 7.2/9.5$; A1 [2]
- 5** $93.9975\text{ cm}^2 - B1\ 12.45\ or\ 7.55\ seen$; $M1\ 12.45 \times 7.55$; A1 [3]
- 6** $2x^3 - 3x^2 - 17x - 12 - M1\ two\ brackets\ correct\ (e.g.\ 2x^2 - 5x - 12)$; M1 at least 6 of 8 terms correct after multiplying by the third bracket; A1 [3]
- 7** $-2.77, 1.27 - M1\ substitution\ into\ the\ formula$; $M1\ (-3 \pm \sqrt{65})/4$; A1 [3]
- 8** (a)(i) 90° B1 [1] (a)(ii) $136^\circ - M1\ angle\ OTQ = 90 - 68 = 22$ and $OQT = 22$ (isosceles); A1 136 ; C1 reasons: tangent $\perp$ radius; base angles of isosceles triangle equal; angles in a triangle sum to 180° [3] (b) 68° B1; alternate segment theorem (or angle at the circumference is half the angle at the centre, $136 \div 2$) B1 [2]
- 9** (a) $0.6, 1.8, 3, 1.4, 0.3$ B2 (B1 for three correct) [2] (b) $23 - M1\ 10/15 \times 21 (= 14)$; A1 [2]
- 10** (a) $8.31\text{ cm} - M1\ 8.6^2 + 11.3^2 - 2 \times 8.6 \times 11.3 \times \cos 47$; $M1\ \sqrt{\quad}$; A1 [3] (b) $35.5\text{ cm}^2 - M1\ 1/2 \times 8.6 \times 11.3 \times \sin 47$; A1 [2]
- 11** (a) $(x - 4)/(2x + 1) - B1\ (x - 4)(x + 4)$; $B1\ (2x + 1)(x + 4)$; A1 [3] (b) $0.354, 5.65 - M1\ 3(x - 2) + 2(x + 1) = (x + 1)(x - 2)$; $M1\ x^2 - 6x + 2 = 0$; M1 formula; A1 [4]

Unit 6 · Sheet B — Higher Paper 1H practice paper

- 1** $3\sqrt{3} - M1\ 5\sqrt{3}\ or\ 2\sqrt{3}$; A1 [2]
- 2** (a) $14 - M1\ g(-2) = 4$; A1 [2] (b) $(x - 2)/3 - M1$; A1 [2] (c) $x = 0, x = -4/3 - M1\ (3x + 2)^2 = 4$; $M1\ 3x + 2 = \pm 2$; A1 [3]
- 3** (a) $v = 3t^2 - 12t + 9$ B2 (B1 for two terms correct) [2] (b) $t = 1$ and $t = 3 - M1\ 3t^2 - 12t + 9 = 0$; A1 [2]
- 4** $35/66 - M1\ 5/12 \times 7/11\ or\ 7/12 \times 5/11$; M1 sum of both (or $1 - P(\text{same})$); A1 [3]
- 5** (a) $1/2\ a + 1/4\ b - M1\ OM = 1/2(a + b)$; $M1\ NM = -1/4\ b + 1/2(a + b)$; A1 [3] (b) $NP = a + 3/4\ b - 1/4\ b = a + 1/2\ b$ M1; $= 2\ NM$ A1; so NP is parallel to NM and N is a common point, hence N, M, P are collinear C1 [3]
- 6** (a) $(5, -4)$ B1 [1] (b) $(3, 2)$ B1 [1] (c) $(3, 4)$ B1 [1]
- 7** $-3 \leq x \leq 4 - M1\ (x - 4)(x + 3)$; A1 critical values; A1 [3]
- 8** M1 e.g. $1000x = 236.3636\dots$ and $10x = 2.3636\dots$; $M1\ 990x = 234$; A1 $234/990 = 13/55$ shown [3]
- 9** $M1\ 4n^2 + 4n + 1 - (4n^2 - 4n + 1)$; $A1 = 8n$; C1 $8n = 8 \times n$, so a multiple of 8 [3]
- 10** $(2, 12) - M1\ dy/dx = 2x - 16x^{-2}$; $M1\ 2x - 16/x^2 = 0 \Rightarrow x^3 = 8$; A1 [3]

Unit 7 · Sheet A — Higher Paper 2H practice paper

- 1** (a) 55081 — M1 $48\,000 \times 1.035^4$; A1 **[2]** (b) 7 — M1 trials of 1.035^n ($1.035^6 = 1.229$, $1.035^7 = 1.272$); A1 **[2]**
- 2** (a) 10.8 m — M1 $\sin 4.8 = 0.9/L$; M1 $0.9 \div \sin 4.8$; A1 **[3]** (b) 10.7 m — M1 $0.9 \div \tan 4.8$ or Pythagoras with their (a); A1 **[2]**
- 3** (a) (7 over 8) as a column vector B1 **[1]** (b) 10.6 — M1 $\sqrt{7^2 + 8^2}$; A1 ft **[2]**
- 4** (a) Points (50, 6), (60, 21), (70, 49), (80, 70), (90, 77), (100, 80) plotted at upper bounds B2 (B1 for 4 correct or plotting at consistent wrong points); curve or line segments B1 **[3]** (b) about 67 (accept 65–68) B1 ft **[1]** (c) about 16 ($UQ \approx 75$, $LQ \approx 59$) — M1 readings at 60 and 20; A1 ft **[2]**
- 5** $a = (4 - 6b)/(3 - c)$ — M1 $3a + 6b = ac + 4$; M1 $3a - ac = 4 - 6b$; M1 $a(3 - c) = 4 - 6b$; A1 **[4]**
- 6** (a) $2/3$ B1 **[1]** (b) $y = -3/2x + 7$ (or $2y + 3x = 14$) — M1 gradient $-3/2$; M1 substitution of (4, 1); A1 **[3]**
- 7** (a) 10.5 cm — M1 $75/360 \times 2 \times \pi \times 8$; A1 **[2]** (b) 11.0 cm² — M1 $75/360 \times \pi \times 8^2$ (= 41.89); M1 $1/2 \times 8 \times 8 \times \sin 75$ (= 30.91); A1 **[3]**
- 8** (a) 1.5 m/s² — M1 $15 \div 10$; A1 **[2]** (b) 450 m — M1 area of one part; M1 complete method (trapezium $1/2(20 + 40) \times 15$); A1 **[3]**
- 9** $(7x + 13)/((x + 3)(x - 1))$ — M1 common denominator; M1 $2(x - 1) + 5(x + 3)$; A1 **[3]**

Unit 7 · Sheet B — Higher Paper 2H practice paper

- 1** $x = 1$, $y = 3$ and $x = -1.8$, $y = -2.6$ — M1 $x^2 + (2x + 1)^2 = 10$; A1 $5x^2 + 4x - 9 = 0$; M1 $(5x + 9)(x - 1) = 0$; A1 x values; A1 y values **[5]**
- 2** $(3x + 1)/(x - 2)$ — M1 $x(y - 3) = 2y + 1$ or $y(x - 3) = 2x + 1$; M1 collecting terms; A1 **[3]**
- 3** (a) 12 — M1 $35 + 28 + 9 - 60$; A1 **[2]** (b) $12/28 = 3/7$ B1 ft **[1]**
- 4** (a) 3 — M1 $dy/dx = 4x - 5$; A1 **[2]** (b) $y = 3x - 5$ — M1 $y - 1 = 3(x - 2)$; A1 **[2]** (c) (1.25, -0.125) — M1 $4x - 5 = 0$; A1 **[2]**
- 5** 35 — M1 $3x + 10 + 2x - 5 = 180$; A1; B1 opposite angles of a cyclic quadrilateral add up to 180° **[3]**
- 6** 436 cm³ — M1 $1/3 \times \pi \times 6^2 \times 12$; M1 $1/3 \times \pi \times 2^2 \times 4$; M1 subtraction; A1 **[4]**
- 7** 9.87 cm — M1 $1/2 \times 1.5x \times x \times \sin 38 = 45$; M1 $x^2 = 90 \div (1.5 \sin 38)$; A1 **[3]**
- 8** (a) 22 — M1 5×4.4 ; A1 **[2]** (b) 85 — M1 at least three frequencies correct (12, 18, 22, 21, 12); A1 **[2]**
- 9** M1 $2(x - 3)^2 + 5$; A1 correct form; C1 $(x - 3)^2 \geq 0$ so $2(x - 3)^2 + 5 \geq 5 > 0$ **[3]**
- 10** 1.667 — B1 12.85, 5.35 or 4.5 seen; M1 $(12.85 - 5.35) \div 4.5$; A1 **[3]**
- 11** $2n^2 + n + 1$ — M1 second difference 4 so $2n^2$; M1 subtract $2n^2$ to give $n + 1$; A1 **[3]**

Unit 8 · Sheet A — Mixed problem solving

- 1** 108 cm²
- 2** 20
- 3** \$60
- 4** 24
- 5** 7.5
- 6** \$31
- 7** 9
- 8** 15
- 9** 4 cm
- 10** after 60 s
- 11** 1.8 km
- 12** 54 km/h
- 13** \$3240
- 14** 66

Unit 8 · Sheet B — Mixed problem solving

- 1** \$75.33 — M1 64×1.07 (= 68.48); M1 $\times 1.10$; A1 **[3]**
- 2** 3 packs of cups and 2 packs of plates — M1 multiples of 12 and 18; A1 36; A1 **[3]**
- 3** 6.42 g/cm³ — P1 300×8.9 (= 2670); P1 200×2.7 (= 540); P1 total mass $\div 500$; A1 **[4]**
- 4** 1.2 kg jar — M1 $6.30 \div 750$ (= 0.84 cents/g) or $9.84 \div 1200$ (= 0.82 cents/g) or equivalent; M1 both; C1 conclusion with correct values **[3]**
- 5** 71.8 — M1 $24 \times 68 + 28 \times 75$ (= 3732); M1 $\div 52$; A1 **[3]**
- 6** 6 hours — M1 $4 \times 9 = 36$ pump-hours; A1 **[2]**
- 7** (a) $(x + 3)(2x - 1) = 40$ M1; $2x^2 + 5x - 3 = 40 \Rightarrow 2x^2 + 5x - 43 = 0$ A1 **[2]** (b) $x = 3.55$; width = 6.10 cm — M1 $(-5 \pm \sqrt{369})/4$; A1 x ; A1 width **[3]**
- 8** 231 cm³ — M1 $2/3 \times \pi \times 3.5^3$; M1 $1/3 \times \pi \times 3.5^2 \times 11$; A1 **[3]**
- 9** 3423.75 m² — B1 84.5 or 41.5; M1 $(84.5 - 2) \times 41.5$; A1 **[3]**
- 10** (a) \$480 — M1 $20/2[2 \times 5 + 19 \times 2]$; A1 **[2]** (b) week 30 — M1 $n/2[10 + 2(n - 1)] > 1000 \Rightarrow n^2 + 4n - 1000 > 0$; M1 $n = 29.6...$ or trials (29: 957, 30: 1020); A1 **[3]**

End-of-book check

- 1** 12.0
- 2** 6
- 3** 9.3×10^{-5}
- 4** $x = 23$
- 5** \$258
- 6** $(x + 7)(x - 4)$
- 7** 78.5 cm²
- 8** 150°
- 9** 10
- 10** 14
- 11** -3
- 12** 58.0°
- 13** x^7
- 14** $r = \sqrt{(A/(4\pi))}$