



BRITISH LEARNING CENTRE

CAMBRIDGE IGCSE · 0580

Mathematics

Exam Practice

Exam technique, non-calculator and calculator skills, and four original practice papers in the style of Cambridge IGCSE Mathematics 0580
Papers 1, 2, 3 and 4, 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.

#	Syllabus ref	Topic · I can...	R	A	G
1	Papers 1–4 Core & Extended	Exam technique and command words I can read exam questions carefully, show the working that earns marks and give answers to the right accuracy.			
2	Paper 1, Paper 2 Core & Extended	Non-calculator skills I can use reliable written and mental methods, and give exact answers, without a calculator.			
3	Paper 3, Paper 4 Core & Extended	Calculator skills and accuracy I can use a scientific calculator efficiently and round final answers to the accuracy asked for.			
4	Paper 1 Core	Core Paper 1 practice paper I can complete a Core Paper 1 style paper (non-calculator) accurately within the time.			
5	Paper 3 Core	Core Paper 3 practice paper I can complete a Core Paper 3 style paper (calculator) accurately within the time.			
6	Paper 2 Extended	Extended Paper 2 practice paper I can complete a Extended Paper 2 style paper (non-calculator) accurately within the time.			
7	Paper 4 Extended	Extended Paper 4 practice paper I can complete a Extended Paper 4 style paper (calculator) accurately within the time.			
8	Papers 1–4 Core & Extended	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. You may use a calculator. Give non-exact answers to 3 significant figures.

1

Round 0.078 46 to 2 significant figures.

2

Work out $3/4 - 2/5$.

3

Write 2.6×10^{-3} as an ordinary number.

4

Solve $4x - 7 = 2x + 9$.

5

Find 12% of 350.

6

Expand and simplify $(x + 3)(x - 5)$.

7

Find the area of a triangle with base 9 cm and height 6.4 cm.

8

Find the sum of the interior angles of a hexagon.

9

$P(\text{rain}) = 0.35$. Find $P(\text{no rain})$.

10

Find the mean of 4, 7, 9, 12, 13.

11

Find the gradient of the line through (1, 3) and (4, 12).

12

The shorter sides of a right-angled triangle are 5 cm and 12 cm. Find the hypotenuse.

13

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

14

$\sin x = 0.6$. Find x to 1 decimal place.

Exam technique and command words

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

Syllabus ref: Papers 1–4 · Core & Extended

From 2025, Cambridge IGCSE Mathematics 0580 has four papers. Core candidates sit Paper 1 (non-calculator) and Paper 3 (calculator). Extended candidates sit Paper 2 (non-calculator) and Paper 4 (calculator). Each paper is worth 50% of the qualification.

The command word tells you **what** to do; the marks tell you **how much** to write.

Key words

command word

method mark (M)

accuracy mark (A)

significant figures

show that

exact answer

Key points

- Core: Papers 1 and 3, 1 h 30 min, 80 marks each.
Extended: Papers 2 and 4, 2 h, 100 marks each.
- **Write down** = little or no working. **Calculate / Work out** = show the method. **Show that** = every step to the printed result. **Explain** = a reason in words.
- M = method mark, A = accuracy mark (needs the M mark), B = independent mark.
- Unless told otherwise: 3 s.f.; angles to 1 d.p.; money to 2 d.p.

Worked example — how the marks are awarded

Calculate the area of a circle with diameter 9 cm. [2]

Radius = 4.5 cm, so area = $\pi \times 4.5^2 = 63.617\dots = \mathbf{63.6\text{ cm}^2}$

Mark scheme: M1 for $\pi \times 4.5^2$; A1 for 63.6 (accept 63.61 to 63.62).

Common mistakes

- Answering a different question from the one asked, e.g. giving the radius when the area is required.
- Writing only an answer to a 3- or 4-mark question — one small slip then scores 0.

Exam tip: Look at the marks before you start: they tell you how many steps are needed and how long to spend (about 1 minute per mark).

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

- 1 Which command word means that little or no working is needed?
☐ Calculate ☐ Write down ☐ Show that ☐ Explain
- 2 A question says 'Show that $x = 7$ '. What must you write?
☐ only $x = 7$ ☐ every step leading to $x = 7$ ☐ a reason in words ☐ a sketch
- 3 Round 6.0479 to 3 significant figures.
- 4 Round 0.040 572 to 3 significant figures.
- 5 Round 38 652 to 2 significant figures.
- 6 Round 17.996 to 2 decimal places.
- 7 An angle is 37.4682° . Write it correct to 1 decimal place.
- 8 Write \$12.6 correctly as an amount of money.
- 9 A 2-mark part is marked M1 A1. Sam uses the correct method but makes an arithmetic slip. How many marks does he score?
- 10 In a mark scheme, what does 'ft' mean?
- 11 Which answer is given 'in terms of π '?
☐ 28.3 cm^2 ☐ $9\pi \text{ cm}^2$ ☐ 28.27 cm^2 ☐ $9 \times 3.14 \text{ cm}^2$
- 12 Write $21/28$ in its simplest form.
- 13 Write 3 hours 45 minutes in hours, as a decimal.
- 14 $x^2 = 49$. Which is the complete answer?
☐ $x = 7$ ☐ $x = -7$ ☐ $x = 7$ or $x = -7$ ☐ $x = 24.5$

15 Write 0.000 52 in standard form.

16 Paper 4 has 100 marks in 120 minutes. About how many minutes should you spend on a 6-mark question?

17 'Give your answer correct to 1 decimal place.' The calculator shows 14.9681. Which answer is correct?

☐ 14.9 ☐ 15.0 ☐ 15 ☐ 14.97

18 Change 2.5 m^2 into cm^2 .

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

Answer all questions. Show all your working. You may use a calculator unless the question says otherwise.

- 1 (a) Show that one interior angle of a regular hexagon is 120° . [2]

- (b) Explain why regular hexagons can fit together without leaving gaps. [1]

- 2 Priya solves the equation $3(x - 4) = 18$. Here is her working.

$$3x - 4 = 18$$

$$3x = 22$$

$$x = 7.33$$

- (a) Explain the mistake that Priya makes. [1]

- (b) Solve the equation correctly. [2]

Answer $x =$

- 3 A school trip has 340 students and 26 teachers. Each coach can carry 52 people and costs \$185 for the day.

- (a) Work out the smallest number of coaches needed. [2]

Answer

- (b) Work out the total cost of the coaches. [1]

Answer \$

- (c) The total cost is shared equally between all the people on the trip. Work out the cost for each person. Give your answer correct to the nearest cent. [2]

- 4 A cylinder has radius 3.6 cm and height 11.5 cm.

(a) Calculate the volume of the cylinder. Give your answer correct to 3 significant figures. [2]

Answer cm^3

(b) Write your answer to part (a) correct to the nearest 10 cm^3 . [1]

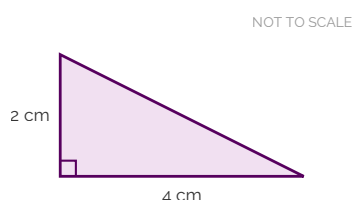
Answer cm^3

(c) Change your answer to part (a) into litres. [1]

Answer litres

- 5 This question is in the style of the non-calculator paper.

The diagram shows a right-angled triangle.



(a) Show that the length of the hypotenuse is $2\sqrt{5}$ cm. [2]

(b) Find the perimeter of the triangle. Give your answer in the form $a + b\sqrt{5}$. [1]

Answer cm

- 6 Pens are sold in two packs.

Pack A: 6 pens for \$4.50

Pack B: 10 pens for \$7.20

(a) Which pack is better value? Show how you decide. [3]

Answer Pack

(b) Explain why a customer might still choose Pack A. [1]

7

(a) By rounding each number to 1 significant figure, estimate the value of $(48.7 \times 3.08) \div 0.19$.
Show your working. **[2]**

Answer

(b) Use your calculator to find the value of $(48.7 \times 3.08) \div 0.19$ correct to 3 significant figures.

Answer **[1]**

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

Non-calculator skills

I can... use reliable written and mental methods, and give exact answers, without a calculator.

Syllabus ref: Paper 1, Paper 2 · Core & Extended

Papers 1 and 2 must be done without a calculator. You need reliable written methods for whole numbers, decimals and fractions, and quick mental skills such as finding 10%, 5% and 1%.

Extended candidates must also give **exact** answers: fractions, surds and multiples of π . Estimating first helps you to spot a wrong answer.

Key words

written method

decimal places

common denominator

reciprocal

surd

estimate

Key points

- Multiplying decimals: ignore the points, multiply, then put back the total number of decimal places.
- Dividing by a decimal: multiply both numbers by 10, 100, ... first, e.g. $7.2 \div 0.08 = 720 \div 8 = 90$.
- Fractions: use a common denominator to add or subtract; to divide, multiply by the reciprocal; change mixed numbers to improper fractions first.
- Percentages: $10\% = \div 10$, $5\% = \text{half of } 10\%$, $1\% = \div 100$.
- Surds: $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$, so $\sqrt{50} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$.

Worked example 1

Work out $2 \frac{2}{5} \div \frac{3}{4}$. Give your answer as a mixed number.

$$2 \frac{2}{5} = \frac{12}{5}$$

$$\frac{12}{5} \times \frac{4}{3} = \frac{48}{15} = \frac{16}{5}$$

$$= 3 \frac{1}{5}$$

Common mistakes

- Putting the decimal point back in the wrong place after multiplying.
- Dividing fractions by turning the first fraction upside down instead of the second.
- Writing $\sqrt{9} + \sqrt{16} = \sqrt{25}$: the square root of a sum cannot be split.

Exam tip: Set out column methods neatly in the working space — the examiner must be able to see them to award method marks.

Do not use a calculator. Give fractions in their simplest form.

1 37×46

2 $1584 \div 12$

3 $4.7 + 12.85$

4 $9 - 3.46$

5 0.3×0.07

6 $7.2 \div 0.08$

7 $3/5 + 1/3$

8 $5/6 - 1/4$

9 $2/3 \times 9/10$

10 $4/7 \div 2/21$

11 $1 1/2 + 2 2/3$

12 15% of 80

13 17.5% of 120

14 $-3 \times 8 + 5$

15 $2^3 \times 3^2$

16 $\sqrt{0.49}$

17 $\sqrt[3]{125}$

18 $\sqrt{12} \times \sqrt{3}$

19 $0.6 \times 0.45 \div 0.09$

20 Estimate $(412 \times 5.87) \div 0.31$ by
rounding each number to 1 s.f.

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

Do not use a calculator. Show all your working.

- 1 Work out $3\frac{3}{4} - 1\frac{5}{6}$.

Give your answer as a mixed number in its simplest form.

[3]

Answer

- 2 Sara buys 3.4 kg of rice at \$2.35 per kilogram.

Work out the total cost.

[3]

Answer \$

- 3 A recipe for 6 people uses 450 g of flour and 180 ml of milk.

(a) Work out the amount of flour needed for 10 people.

[2]

Answer g

(b) Ana has 1 litre of milk and plenty of flour.

Work out the greatest number of people she can make the recipe for.

[2]

Answer

- 4 Without using a calculator, find the highest common factor (HCF) and the lowest common multiple (LCM) of 84 and 90.

[4]

Answer HCF = LCM =

- 5 A laptop costs \$640. In a sale the price is reduced by 35%.

Work out the sale price.

[3]

Answer \$

6 *Extended*

- (a) Simplify $\sqrt{48} - \sqrt{12}$.

[2]

Answer

- (b) Rationalise the denominator and simplify $10/\sqrt{5}$.

[2]

Answer

- (c) Expand and simplify $(3 + \sqrt{2})(3 - \sqrt{2})$.

[2]

Answer

- (d) Find the value of $81^{3/4}$.

[1]

Answer

- 7 Write these numbers in order of size, starting with the smallest.

0.35 $3/8$ 36% 0.305

[2]

Answer

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

Calculator skills and accuracy

I can... use a scientific calculator efficiently and round final answers to the accuracy asked for.

Syllabus ref: Paper 3, Paper 4 · Core & Extended

Papers 3 and 4 need a scientific calculator. Many marks are lost by typing a calculation in the wrong order, using the wrong mode or rounding too early.

Use brackets, write down the full display, and round once, at the very end.

Key points

- Fractions: type $(4.7 + 3.1) \div (2.4 - 0.9)$, or use the fraction key.
- Check for **degrees** mode (D or DEG) before trigonometry.
- Standard form: use the $\times 10^x$ key; write 3.2×10^{-4} , not 3.2E-4.
- Significant figures start at the first non-zero digit: 0.004 718 = 0.004 72 (3 s.f.).

Key words

brackets

ANS key

degree mode

standard form

significant figures

full display

Worked example 1

Work out $(5.8^2 - \sqrt{40}) \div (2.7 \times 1.6)$. Give your answer to 3 significant figures.

Type $(5.8^2 - \sqrt{(40)}) \div (2.7 \times 1.6)$. Display: 6.3230196...

Answer: **6.32**

Worked example 2

Opposite = 7.3 cm, hypotenuse = 11.8 cm. Find angle x .

$$x = \sin^{-1}(7.3 \div 11.8) = 38.2172... = \mathbf{38.2^\circ} \text{ (1 d.p.)}$$

Common mistakes

- Typing $12 + 8 \div 4$ when you mean $(12 + 8) \div 4$.
- Using a rounded value from part (a) in part (b).

Exam tip: Write down what you type in — 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 $(7.4 + 2.86) \div 3.2$

2 $\sqrt{(18.4^2 - 9.6^2)}$

3 $4.2^3 - 2.5^4$

4 $1/0.32 + 1/0.45$

5 $\sin 38^\circ$

6 $12.5 \cos 64^\circ$

7 $\tan^{-1}(5.6 \div 8.3)$ (1 d.p.)

8 $\pi \times 6.4^2$

9 $4/3 \times \pi \times 2.9^3$

10 2500×1.035^6 (to 2 d.p.)

11 $\sqrt[3]{500}$

12 $(2.3 + 4.15) \div (6.8 - 1.95)$ (to 2 d.p.)

13 $(3.6 \times 10^5) \times (2.5 \times 10^{-2})$ in standard form

14 $(8.1 \times 10^7) \div (2.7 \times 10^{-3})$ in standard form

15 $(1.8 \times 10^{-4}) \div (6 \times 10^2)$ in standard form

16 2.5^{-2} (exact)

17 Write 3.7 hours in hours and minutes.

18 Round 0.004 718 to 3 s.f.

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

Use a calculator. Show all your working. Give non-exact answers to 3 significant figures.

1

(a) Use your calculator to work out $(12.6 + 4.75^2) \div (\sqrt{30} - 1.8)$.

Write down all the figures on your calculator display.

[2]

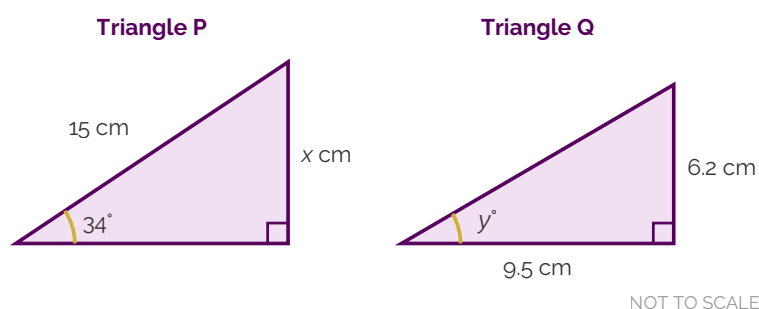
Answer

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

[1]

Answer

2



(a) Calculate the length x in triangle P.

[2]

Answer $x =$ cm

(b) Calculate the angle y in triangle Q. Give your answer correct to 1 decimal place.

[2]

Answer $y =$

3

Rashid invests \$4800 at a rate of 2.6% per year compound interest.

(a) Calculate the value of the investment after 7 years. Give your answer correct to the nearest cent.

[2]

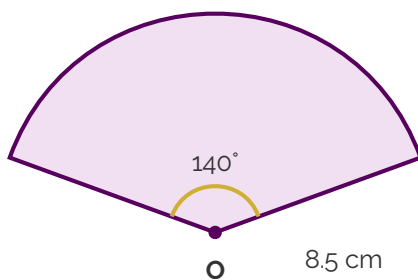
Answer \$

(b) Find the number of complete years until the value is first more than \$6000.

[2]

Answer

- 4 The diagram shows a sector of a circle, centre O, radius 8.5 cm and angle 140° .



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- (a) Calculate the arc length. [2]

Answer cm

- (b) Calculate the perimeter of the sector. [1]

Answer cm

- (c) Calculate the area of the sector. [2]

Answer cm^2

- 5 The mass of the Earth is 5.97×10^{24} kg. The mass of the Moon is 7.35×10^{22} kg.

- (a) How many times heavier is the Earth than the Moon? [2]

Answer

- (b) Work out the total mass of the Earth and the Moon. Give your answer in standard form. [2]

Answer kg

6 A coach travels 342 km in 3 hours 48 minutes.

(a) Calculate the average speed in km/h.

[3]

Answer km/h

(b) Change your answer to part (a) into metres per second.

[1]

Answer m/s

7 The length, l cm, of a pencil is 8.4 cm, correct to 1 decimal place.
Complete this statement about the value of l .

[2]

Answer $\leq l <$

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

Core Paper 1 practice paper

I can... complete a Core Paper 1 style paper (non-calculator) accurately within the time.

Syllabus ref: Paper 1 · Core

Paper 1 is the **non-calculator** paper for the Core tier. It has many short questions (1–3 marks each) on number, simple algebra, geometry, probability and statistics. Questions become longer and harder towards the end.

Write every step: on a non-calculator paper the method marks are where most marks come from. Keep fractions as fractions and use written methods you trust.

Key words

write down

work out

show that

give a reason

simplest form

estimate

Key points

- Real paper: 1 hour 30 minutes, 80 marks, no calculator allowed.
- This practice paper: 65 marks — allow about 75 minutes (Part 1 + Part 2).
- Give exact answers (fractions, surds, π) where asked.
- The paper is worth 50% of the Core qualification (grades C–G).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

How marks are awarded

Work out $3/4 \div 1\frac{1}{2}$. Give your answer in its simplest form. [2]

$1\frac{1}{2} = 3/2$, so $3/4 \times 2/3$ (M1 for using the reciprocal)
 $= 6/12 = 1/2$ (A1)

Common mistakes

- Using the wrong order of operations — the normal rules still apply.
- Giving $21/6$ when the question asks for a mixed number in its simplest form.
- Forgetting units (cm, cm^2 , km/h) or the \$ sign in money answers.

Exam tip: Plan about 1 minute per mark. If a question is taking too long, move on and come back to it at the end.

Answer all questions. You must not use a calculator. Show all your working. Part 1: 33 marks, about 40 minutes.

1 (a) Write the number seven thousand and forty-five in figures. [1]

Answer

(b) Write 0.37 as a percentage. [1]

Answer

2 Here is a list of numbers.

12 15 17 21 25 27 36

From the list, write down

(a) a prime number, [1]

Answer

(b) a square number, [1]

Answer

(c) a factor of 60, [1]

Answer

(d) a multiple of 9. [1]

Answer

3 (a) Round 46.0682 correct to 2 decimal places. [1]

Answer

(b) Round 46.0682 correct to 3 significant figures. [1]

Answer

4 Simplify. $5a + 3b - 2a + b$ [2]

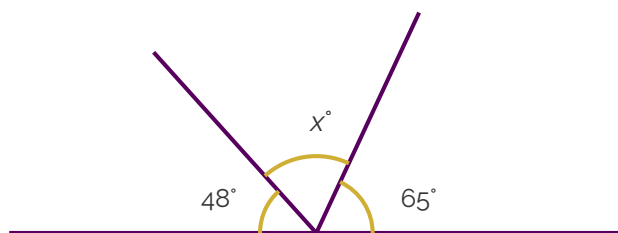
Answer

5 Without using a calculator, work out $\frac{2}{3} + \frac{1}{4}$.
You must show all your working. [2]

Answer

- 6 The diagram shows three angles on a straight line.
Find the value of x . Give a reason for your answer.

[2]



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Answer

- 7 (a) Expand. $4(2x - 5)$

[1]

Answer

- (b) Solve. $3x + 7 = 22$

[2]

Answer

- (c) Factorise completely. $6y + 15$

[1]

Answer

- 8 Write 360 as a product of its prime factors.

[2]

Answer

- 9 Amira and Ben share \$84 in the ratio 3 : 4.
Work out how much each person receives.

[2]

Answer

- 10 Work out 15% of 240.

[2]

Answer

- 11 Here are the first four terms of a sequence.

5 9 13 17

(a) Write down the next term.

[1]

Answer

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

[2]

Answer

(c) Show that 99 is **not** a term of this sequence.

[1]

Answer

- 12 A bag contains 5 red counters, 3 blue counters and 2 green counters. Lina takes one counter at random.

(a) Find the probability that the counter is blue.

[1]

Answer

(b) Find the probability that the counter is **not** green.

[1]

Answer

(c) Lina replaces the counter. She does this 40 times. Work out the expected number of times she takes a red counter.

[1]

Answer

- 13 By rounding each number correctly to 1 significant figure, estimate the value of $(39.8 \times 6.12) \div 0.198$

You must show all your working.

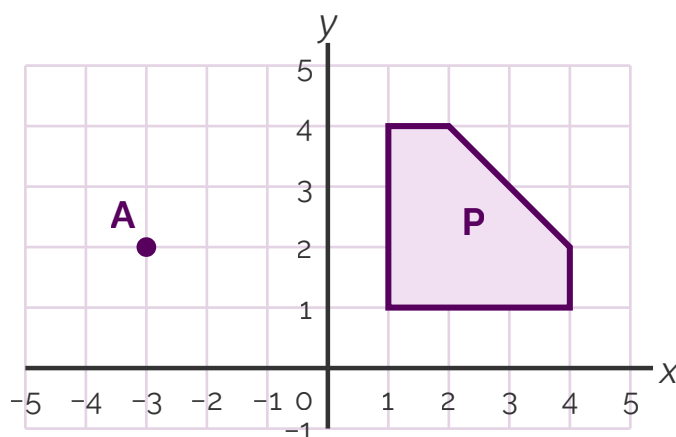
[2]

Answer

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

Continue the paper (numbering restarts on this sheet). You must not use a calculator. Show all your working. Part 2: 32 marks, about 35 minutes.

- 1 Shape P and point A are shown on the grid.



- (a) Write down the coordinates of point A.

[1]

Answer

- (b) On the grid, draw the image of shape P after a reflection in the y-axis.

[2]

- 2 Here are the numbers of emails received by Karim on seven days.

7 3 9 3 8 6 13

- (a) Find the mode.

[1]

Answer

- (b) Find the median.

[1]

Answer

- (c) Find the range.

[1]

Answer

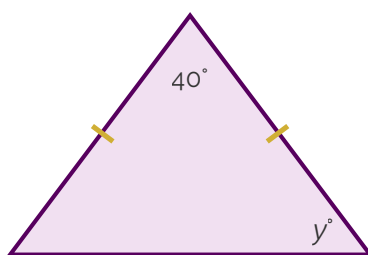
- (d) Find the mean.

[2]

Answer

- 3 The diagram shows an isosceles triangle.
Find the value of y .

[2]

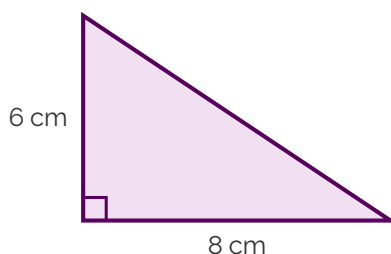


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Answer

- 4 Calculate the length of the hypotenuse of this right-angled triangle.

[2]



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Answer

- 5 (a) Solve the inequality. $5x - 3 < 17$

[2]

Answer

- (b) List the integers n that satisfy $-2 \leq n < 3$.

[2]

Answer

- 6 Without using a calculator, work out $2\frac{1}{3} \times 1\frac{1}{2}$.
Give your answer as a mixed number in its simplest form. You must show all your working.

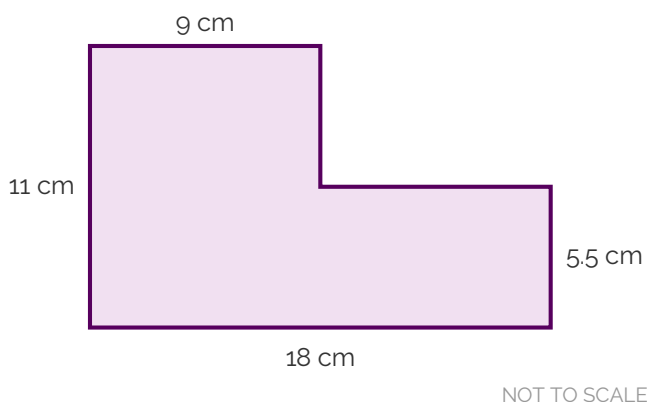
[3]

Answer

- 7** A circle has radius 10 cm.
Work out the area of the circle. Give your answer in terms of π . [2]
-
- Answer**

- 8** Solve the simultaneous equations. You must show all your working. [3]
- $2x + y = 11$
 $x - y = 1$
-
- Answer**

- 9** The diagram shows a shape made from two rectangles.
Work out the area of the shape. [3]



- 10** (a) Work out the size of one interior angle of a regular pentagon. [2]
-
- Answer**
- (b) Write down the number of lines of symmetry of a regular pentagon. [1]
- Answer**

- 11** The price of a concert ticket increases from \$40 to \$46.
Work out the percentage increase. [2]
-
- Answer**

Core Paper 3 practice paper

I can... complete a Core Paper 3 style paper (calculator) accurately within the time.

Syllabus ref: Paper 3 · Core

Paper 3 is the **calculator** paper for the Core tier. It has longer, **structured** questions: each question has a context (a shop, a journey, a survey) and several parts that build on each other.

Write down the calculation you type in and the full display, then round to 3 significant figures unless the question says otherwise.

Key points

- Real paper: 1 hour 30 minutes, 80 marks, calculator required.
- This practice paper: 69 marks — allow about 80 minutes (Part 1 + Part 2).
- Non-exact answers: 3 significant figures; angles: 1 decimal place.
- The paper is worth 50% of the Core qualification (grades C–G).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

Key words

calculate

write down

describe fully

draw

3 significant figures

use your graph

How marks are awarded

A cylinder has radius 3.2 cm and height 7.5 cm. Calculate its volume. [2]

$$\pi \times 3.2^2 \times 7.5 \text{ (M1)}$$

$$= 241.274\dots = \mathbf{241 \text{ cm}^3} \text{ (A1)}$$

Common mistakes

- Rounding too early in a multi-step calculation — keep full values in the calculator.
- Using radians mode instead of degrees in trigonometry.
- Misreading the scale on a graph — check what one small square represents.

Exam tip: If part (a) goes wrong, keep going — later parts often give follow-through marks for using your earlier answer correctly.

Answer all questions. You may use a calculator. Show all your working. Part 1: 31 marks, about 35 minutes.

- 1 Maya runs a juice stall. She buys 12 bottles of mango juice at \$3.85 each.

(a) Work out the total cost.

[1]

Answer

(b) She sells each bottle for \$5.20.

Calculate her percentage profit on one bottle.

[2]

Answer

(c) On Saturday she sells 48 bottles of juice. The ratio mango : orange : apple = 5 : 4 : 3.

How many bottles of orange juice does she sell?

[2]

Answer

(d) Her stall opens at 07 45 and closes 9 hours 40 minutes later. Write down the closing time.

[1]

Answer

- 2 Use your calculator to work out $(4.7^2 + \sqrt{19.36}) \div (3.1 - 0.85)$.

(a) Write down all the figures on your calculator display.

[2]

Answer

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

[1]

Answer

- 3 The table shows the number of goals scored by a football team in 30 matches.

Goals	0	1	2	3	4
Frequency	6	9	7	5	3

(a) Write down the mode.

[1]

Answer

(b) Find the median.

[2]

Answer

(c) Calculate the mean number of goals.

[3]

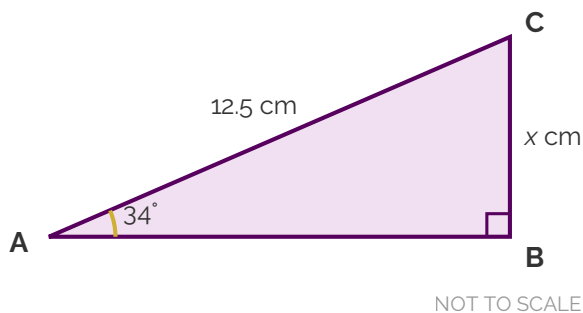
Answer

(d) A pie chart is drawn to show this information. Calculate the sector angle for 2 goals.

[2]

Answer

- 4 Triangle ABC has a right angle at B.



- (a) Calculate the value of x . [2]

Answer

- (b) Calculate the length AB. [2]

Answer

- (c) Calculate the area of triangle ABC. [2]

Answer

- 5 (a) Solve. $5(2x - 3) = 4x + 12$ [3]

Answer

- (b) Factorise. $x^2 + 7x + 12$ [2]

Answer

- (c) Hence solve $x^2 + 7x + 12 = 0$. [1]

Answer

- (d) Rearrange the formula $v = u + at$ to make a the subject. [2]

Answer

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

Continue the paper (numbering restarts on this sheet). You may use a calculator. Show all your working. Part 2: 38 marks, about 45 minutes.

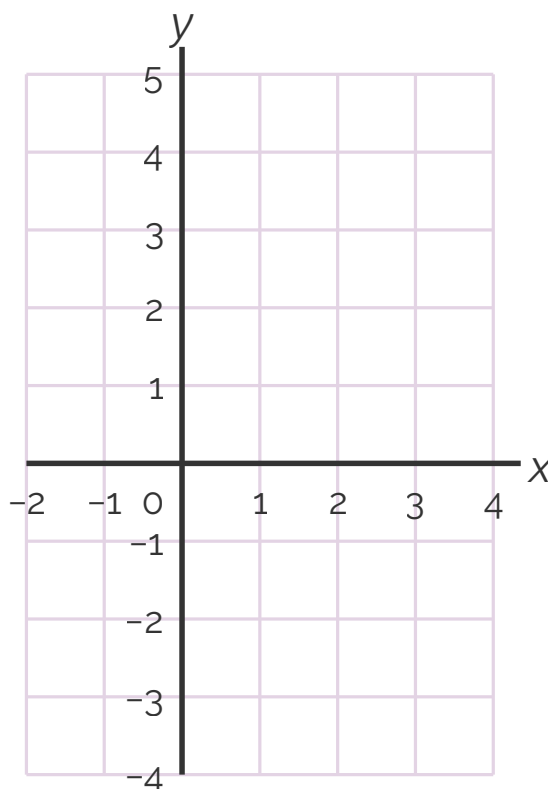
- 1 (a) Complete the table of values for $y = x^2 - 2x - 3$.

[2]

x	-2	-1	0	1	2	3	4
y	5		-3	-4		0	

- (b) On the grid, draw the graph of $y = x^2 - 2x - 3$ for $-2 \leq x \leq 4$.

[3]



- (c) Use your graph to solve the equation $x^2 - 2x - 3 = 0$.

[2]

Answer

- (d) Write down the equation of the line of symmetry of the graph.

[1]

Answer

2 A cylindrical tin has radius 4.5 cm and height 12 cm.

(a) Calculate the volume of the tin.

[2]

Answer

(b) Calculate the total surface area of the tin, including both ends.

[3]

Answer

(c) Write your answer to part (a) in litres.

[1]

Answer

3 Hamid invests \$2500 at a rate of 3.2% per year **simple** interest.

(a) Calculate the total interest after 4 years.

[2]

Answer

(b) Nora invests \$2500 at a rate of 3% per year **compound** interest.

Calculate the value of her investment after 4 years.

[2]

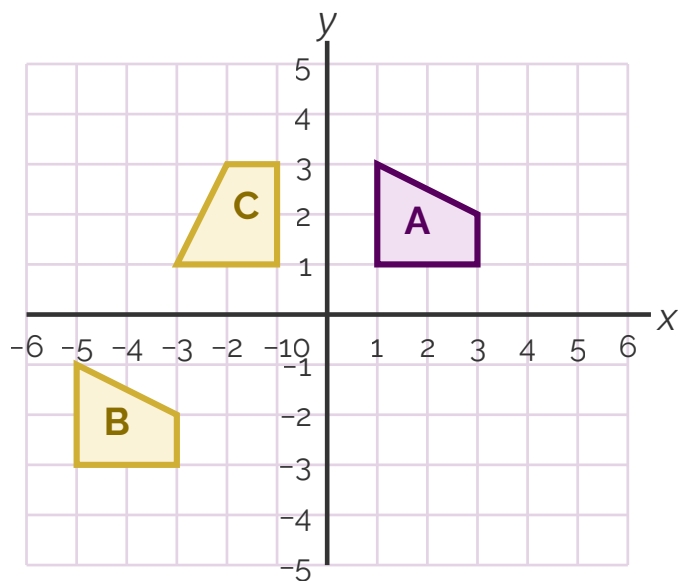
Answer

(c) Who has more money after 4 years, and by how much?

[1]

Answer

- 4 Shapes A, B and C are drawn on the grid.



- (a) Describe fully the **single** transformation that maps shape A onto shape B. [2]

Answer

- (b) Describe fully the **single** transformation that maps shape A onto shape C. [3]

Answer

- (c) On the grid, draw the image of shape A after an enlargement with scale factor 2, centre (0, 0). [2]

- 5 $\mathcal{E} = \{1, 2, 3, \dots, 15\}$
 $A = \{\text{multiples of } 3\}$ $B = \{\text{odd numbers}\}$

- (a) Draw a Venn diagram to show this information. [3]

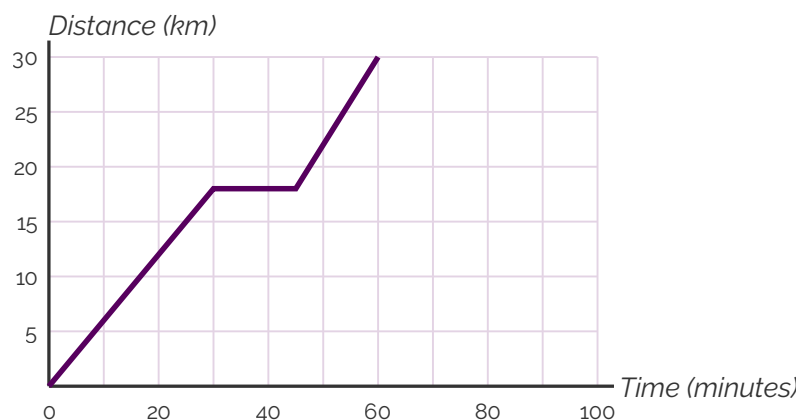
- (b) Find $n(A \cup B)$. [1]

Answer

- (c) A number is chosen at random from $\mathcal{E}$. Find the probability that it is in $A \cap B'$. [1]

Answer

- 6** The travel graph shows Leo's cycle journey from home.
On the time axis 1 square represents 10 minutes; on the distance axis 1 square represents 5 km.



- (a)** How far from home is Leo after 30 minutes? **[1]**

Answer

- (b)** Leo stops for a rest. For how many minutes does he rest? **[1]**

Answer

- (c)** Calculate Leo's speed for the last part of his journey. Give your answer in km/h. **[2]**

Answer

- 7** A fair six-sided dice and a fair coin are thrown together.

- (a)** List all the possible outcomes. **[2]**

Answer

- (b)** Find the probability of getting a head and an even number. **[1]**

Answer

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

Extended Paper 2 practice paper

I can... complete a Extended Paper 2 style paper (non-calculator) accurately within the time.

Syllabus ref: Paper 2 · Extended

Paper 2 is the **non-calculator** paper for the Extended tier. It has about 25 questions, from 1-mark items to multi-part algebra worth 6–8 marks. Many answers must be **exact**: fractions, surds or multiples of π .

Expect algebra, indices and surds, functions, differentiation, exact trigonometric values, circle theorems and vectors — all without a calculator.

Key words

exact

show that

simplify

in terms of π

hence

determine

Key points

- Real paper: 2 hours, 100 marks, no calculator allowed.
- This practice paper: 78 marks — allow about 95 minutes (Part 1 + Part 2).
- Give exact answers (fractions, surds, π) where asked.
- The paper is worth 50% of the Extended qualification (grades A*–E).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

How marks are awarded

Simplify $(2\sqrt{3})^2 + \sqrt{12} \times \sqrt{3}$. [2]

$(2\sqrt{3})^2 = 4 \times 3 = 12$ and $\sqrt{12} \times \sqrt{3} = \sqrt{36} = 6$ (M1 for either)

$12 + 6 = \mathbf{18}$ (A1)

Common mistakes

- Writing $\sqrt{50} + \sqrt{18} = \sqrt{68}$ — only like surds can be added ($5\sqrt{2} + 3\sqrt{2} = 8\sqrt{2}$).
- Sign errors when expanding brackets with a negative number in front.
- Giving a decimal when the question asks for an exact answer.

Exam tip: In 'show that' questions write every step, including a final line that matches the printed result exactly.

Answer all questions. You must not use a calculator. Show all your working. Part 1: 38 marks, about 45 minutes.

- 1 Without using a calculator, work out $1\frac{3}{4} + 2\frac{5}{6}$.

Give your answer as a mixed number in its simplest form. You must show all your working.

[3]

Answer

- 2 (a) Find the value of $27^{2/3}$.

[1]

Answer

- (b) Find the value of $16^{-1/2}$.

[1]

Answer

- (c) Find the value of $(8/27)^{-1/3}$.

[2]

Answer

- 3 (a) Simplify $\sqrt{50} + \sqrt{18}$.

[2]

Answer

- (b) Rationalise the denominator and simplify $6/\sqrt{3}$.

[2]

Answer

4

(a) Factorise completely. $12x^2y - 18xy^2$

[2]

Answer

(b) Factorise. $9a^2 - 25b^2$

[2]

Answer

(c) Factorise. $2x^2 + 7x - 15$

[2]

Answer

5

Find the integer values of x that satisfy the inequality $2x - 5 < 5x + 4 \leq 19$.

[3]

Answer

6

Solve the simultaneous equations. You must show all your working.

$$5x + 2y = 3$$

$$3x - 4y = 20$$

[3]

Answer

7

Find the n th term of this sequence. 3, 8, 15, 24, 35, ...

[2]

Answer

8

y is inversely proportional to the square of x . When $x = 2$, $y = 12$.

Find y when $x = 4$.

[3]

Answer

- 9 A sector of a circle has radius 6 cm and angle 120° .

(a) Find the area of the sector. Give your answer in terms of π .

[2]

Answer

(b) Find the perimeter of the sector. Give your answer in terms of π .

[2]

Answer

- 10 A bag contains 5 red beads and 3 blue beads. Two beads are taken at random without replacement.

Find the probability that the two beads are the same colour.

[3]

Answer

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

[3]

Answer

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

Continue the paper (numbering restarts on this sheet). You must not use a calculator. Show all your working. Part 2: 40 marks, about 50 minutes.

- 1 By completing the square, solve $x^2 - 4x - 1 = 0$.

Give your answers in the form $p \pm \sqrt{q}$.

[3]

Answer

- 2 A is the point $(-2, 5)$ and B is the point $(4, -7)$.

(a) Find the gradient of the line AB.

[1]

Answer

(b) Find the equation of the line AB in the form $y = mx + c$.

[2]

Answer

(c) Find the length of AB. Give your answer in the form $k\sqrt{5}$.

[2]

Answer

(d) Find the coordinates of the midpoint of AB.

[1]

Answer

(e) Find the equation of the perpendicular bisector of AB.

[2]

Answer

- 3 The table shows the heights, h cm, of 45 seedlings.

$0 < h \leq 10$	8
$10 < h \leq 15$	12
$15 < h \leq 25$	15
$25 < h \leq 45$	10

- (a) A histogram is drawn. Calculate the frequency density for each class.

[2]

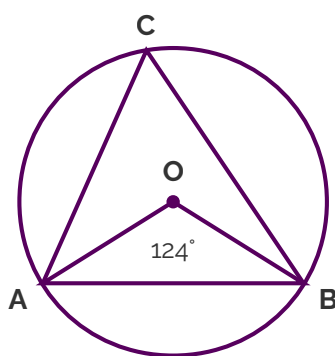
Answer

- (b) Estimate the number of seedlings with height greater than 20 cm.

[2]

Answer

- 4 A, B and C are points on the circle, centre O. Angle AOB = 124° .



NOT TO SCALE

- (a) Find angle ACB. Give a reason for your answer.

[2]

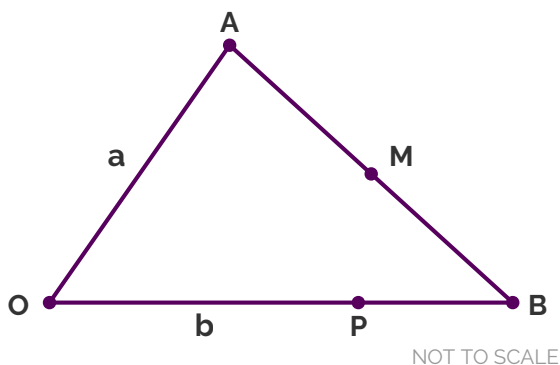
Answer

- (b) PQRS is a cyclic quadrilateral. Angle PQR = 103° .
Find angle PSR.

[1]

Answer

- 5 In the diagram, $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$. M is the midpoint of AB. P lies on OB such that $OP : PB = 2 : 1$.



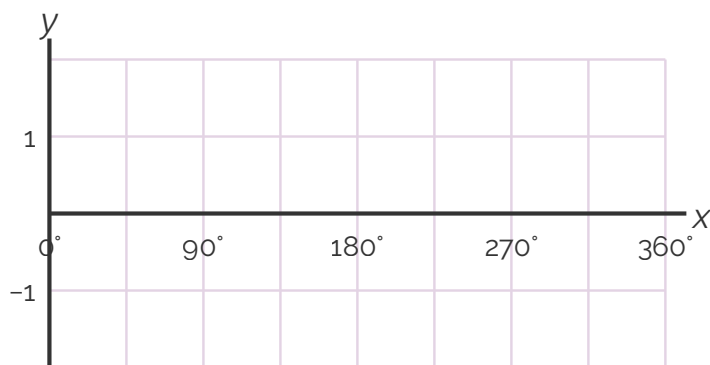
- (a) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form, the vector $\mathbf{OM}$. [2]

Answer

- (b) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, the vector $\mathbf{AP}$. [2]

Answer

- 6 (a) On the axes, sketch the graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$. [2]



- (b) Given that $\sin 30^\circ = 1/2$, solve the equation $\sin x = -1/2$ for $0^\circ \leq x \leq 360^\circ$. [2]

Answer

7 $f(x) = 3x - 2$ $g(x) = x^2 + 1$

(a) Find $fg(2)$.

[2]

Answer

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

[2]

Answer

(c) Find $gf(x)$. Give your answer in its simplest form.

[2]

Answer

8 A curve has equation $y = x^3 - 6x^2 + 9x + 2$.

(a) Find dy/dx .

[2]

Answer

(b) Find the coordinates of the two turning points of the curve.

[4]

Answer

(c) Determine whether each turning point is a maximum or a minimum. Show how you decide.

[2]

Answer

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

Extended Paper 4 practice paper

I can... complete a Extended Paper 4 style paper (calculator) accurately within the time.

Syllabus ref: Paper 4 · Extended

Paper 4 is the **calculator** paper for the Extended tier. It has about 10–12 long structured questions worth 7–12 marks each, usually one topic per question: statistics, trigonometry, graphs, mensuration, probability or algebra.

There is a lot of reading. Underline key information and the accuracy required. Graph questions need a sharp pencil, a ruler and careful plotting.

Key words

calculate

describe fully

estimate

draw

correct to 2 decimal places

use your graph

Key points

- Real paper: 2 hours, 100 marks, calculator required.
- This practice paper: 79 marks — allow about 95 minutes (Part 1 + Part 2).
- Non-exact answers: 3 significant figures; angles: 1 decimal place.
- The paper is worth 50% of the Extended qualification (grades A*–E).
- Mark it with the mark scheme at the back: M = method, A = accuracy, B = independent mark.

How marks are awarded

In triangle ABC, AB = 7 cm, AC = 9 cm and angle BAC = 52°. Calculate BC. [3]

$$BC^2 = 7^2 + 9^2 - 2 \times 7 \times 9 \times \cos 52^\circ \text{ (M2)}$$

$$BC^2 = 52.427\dots, BC = \mathbf{7.24 \text{ cm}} \text{ (A1)}$$

Common mistakes

- Using the sine rule when the cosine rule is needed (two sides and the included angle → cosine rule).
- Plotting cumulative frequency at class midpoints instead of upper class boundaries.
- Leaving out the type or a detail in 'describe fully' transformation questions.

Exam tip: Keep full accuracy in your working and give answers to 3 significant figures (angles to 1 decimal place) unless told otherwise.

Answer all questions. You may use a calculator. Show all your working. Part 1: 40 marks, about 50 minutes.

- 1 The total cost of a holiday is \$2400. The cost is split between flights, hotel and food in the ratio 5 : 4 : 3.

(a)(i) Calculate the cost of the hotel.

[2]

Answer

(a)(ii) The cost of the hotel is 12.5% more than the cost last year. Calculate the cost of the hotel last year.

[2]

Answer

(b) Lena invests \$3000 at a rate of $r\%$ per year compound interest. After 5 years the value of her investment is \$3563.06.

Find the value of r .

[3]

Answer

(c)(i) A car is worth \$18 500. Its value decreases by 14% each year.

Calculate its value after 3 years.

[2]

Answer

- 2 The table shows the masses, m kg, of 120 parcels.

$0 < m \leq 1$	14
$1 < m \leq 2$	32
$2 < m \leq 3$	38
$3 < m \leq 4$	24
$4 < m \leq 6$	12

- (a) Calculate an estimate of the mean mass.

[4]

Answer

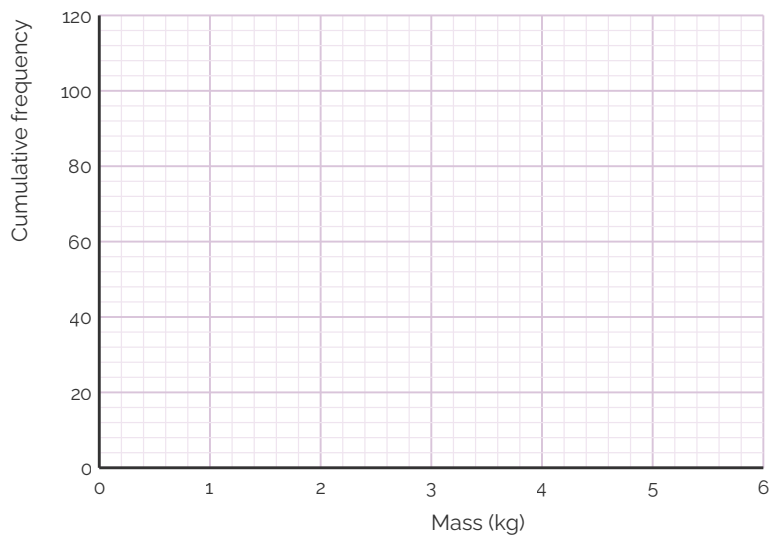
- (b) Complete the cumulative frequency table.

[2]

$m \leq 1$	$m \leq 2$	$m \leq 3$	$m \leq 4$	$m \leq 6$
14				

- (c) On the grid, draw a cumulative frequency diagram.

[3]

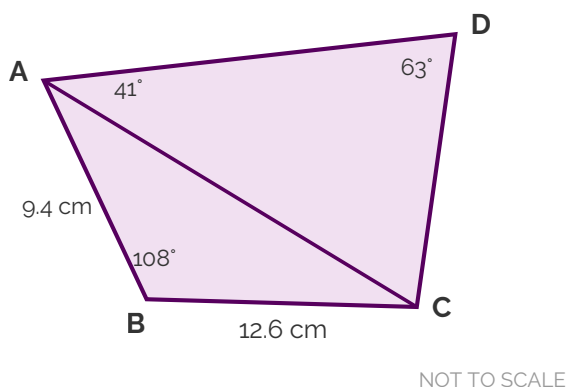


- (d) Use your diagram to find the median and the interquartile range.

[2]

Answer

- 3 The diagram shows quadrilateral ABCD. $AB = 9.4$ cm, $BC = 12.6$ cm, angle $ABC = 108^\circ$, angle $CAD = 41^\circ$ and angle $ADC = 63^\circ$.



(a) Calculate AC.

[4]

Answer

(b) Calculate CD.

[3]

Answer

(c) Calculate the area of triangle ABC.

[2]

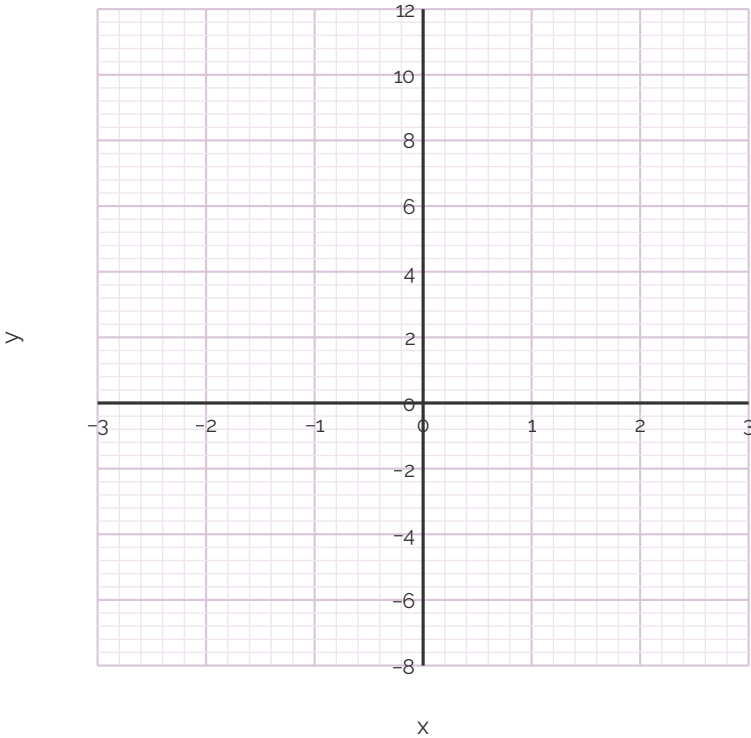
Answer

4

(a) Complete the table of values for $y = x^3 - 6x + 2$. [2]

x	-3	-2	-1	0	1	2	3
y		6	7		-3		11

(b) On the grid, draw the graph of $y = x^3 - 6x + 2$ for $-3 \leq x \leq 3$. [4]



(c) Use your graph to solve the equation $x^3 - 6x + 2 = 0$. [2]

Answer

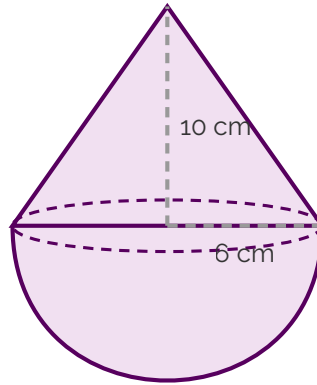
(d) By drawing a suitable straight line, solve the equation $x^3 - 8x + 2 = 0$. [3]

Answer

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

Continue the paper (numbering restarts on this sheet). You may use a calculator. Show all your working. Part 2: 39 marks, about 45 minutes.

- 1 A solid is made from a cone on top of a hemisphere. The radius of both is 6 cm and the height of the cone is 10 cm.



NOT TO SCALE

- (a) Calculate the volume of the solid.

[3]

Answer

- (b) Calculate the total surface area of the solid.

[4]

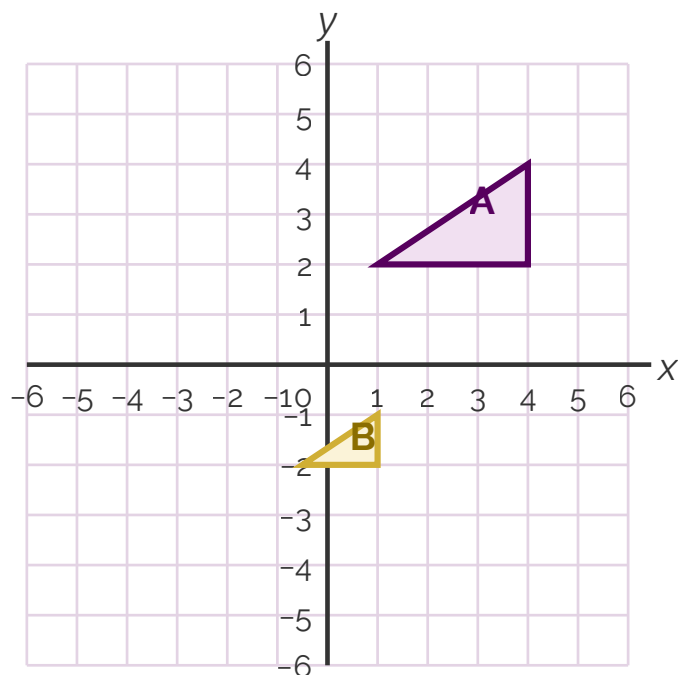
Answer

- (c) The solid is made of metal with density 7.8 g/cm^3 . Calculate the mass of the solid in kilograms.

[2]

Answer

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



- (a) Draw the image of triangle A after a reflection in the line $y = x$. [2]
- (b) Draw the image of triangle A after a rotation of 90° clockwise about $(0, 0)$. [2]
- (c) Describe fully the **single** transformation that maps triangle A onto triangle B. [3]

Answer

- 3** The probability that Asha passes her driving test at the first attempt is 0.7. If she fails, the probability that she passes at the second attempt is 0.8.

(a) Find the probability that she passes in at most two attempts.

[2]

Answer

(b) The probability that Ben passes at the first attempt is 0.6. Asha and Ben take their first tests independently.

Find the probability that exactly one of them passes at the first attempt.

[3]

Answer

(c) Given that exactly one of them passes at the first attempt, find the probability that it is Asha.

[2]

Answer

-
- 4** **(a)** Solve $3x^2 - 5x - 4 = 0$. Show all your working and give your answers correct to 2 decimal places.

[4]

Answer

(b) Solve the equation $4/(x - 1) - 3/(x + 2) = 1$. Give your answers correct to 2 decimal places.

[4]

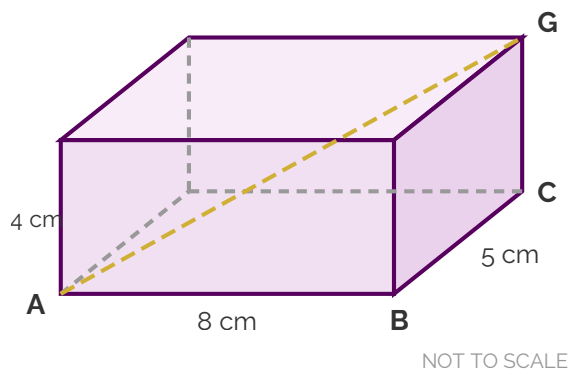
Answer

(c) The sum of the squares of two consecutive odd positive integers is 290. Find the two integers.

[3]

Answer

- 5 The diagram shows a cuboid. $AB = 8\text{ cm}$, $BC = 5\text{ cm}$ and the height is 4 cm .



- (a) Calculate the length of the diagonal AG . [3]

Answer

- (b) Calculate the angle between AG and the base $ABCD$. [2]

Answer

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.

Syllabus ref: Papers 1–4 · Core & Extended

The last questions on every paper are problem-solving questions. They are not labelled with a topic: you have to decide which mathematics to use, and you often need two or three topics together.

Start by writing 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 first, then underline the numbers and the final thing you must find.
- Draw a sketch or a table if the question has no diagram.
- Label each step: 'area of base = ...', 'cost per pen = ...'.
- Check the size of the answer and the units: is it reasonable in the context?
- If you are stuck, write down any relevant fact or formula — it may earn a method mark.

Key words

multi-step

plan

check

reasonable answer

context

units

Worked example

A rectangle has perimeter 34 cm and length 11 cm. A square has the same area as the rectangle. Find the side of the square, correct to 3 s.f.

$$\text{Width} = (34 - 2 \times 11) \div 2 = 6 \text{ cm}$$

$$\text{Area of rectangle} = 11 \times 6 = 66 \text{ cm}^2$$

$$\text{Side of square} = \sqrt{66} = 8.1240\dots = \mathbf{8.12 \text{ cm}}$$

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 reading the final sentence — e.g. giving the number of full boxes when the question asks for the cost.

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 has perimeter 34 cm and length 11 cm. Find its area.

- 3 A shirt costs \$24 after a 20% discount. Find the original price.

- 5 A cube has volume 343 cm^3 . Find its total surface area.

- 7 The mean of five numbers is 8. Four of them are 3, 7, 9 and 12. Find the fifth number.

- 9 A square has the same area as a rectangle 8 cm by 18 cm. Find the side of the square.

- 11 A circle has circumference 31.4 cm. Taking $\pi = 3.14$, find its area.

- 13 A town of 25 000 people grows by 4% each year. Find the population after 3 years (nearest whole number).

- 2 Three consecutive integers add up to 141. Find the largest.

- 4 Boys : girls = 4 : 5. There are 45 girls. How many students are there altogether?

- 6 A car uses 6.5 litres of fuel per 100 km. Fuel costs \$1.40 per litre. Find the fuel cost for 340 km.

- 8 The angles of a triangle are in the ratio 2 : 3 : 4. Find the largest angle.

- 10 A bus leaves every 12 minutes and a tram every 18 minutes. Both leave at 08 00. When do they next leave together?

- 12 Change 72 km/h into metres per second.

- 14 Two numbers have a sum of 23 and a difference of 7. Find their product.

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

Answer all questions. You may use a calculator. Show all your working.

- 1** A mobile phone costs \$640.
Sami pays a deposit of 15% and then 12 equal monthly payments of \$49.50.

(a) Calculate the total amount Sami pays. [3]

Answer

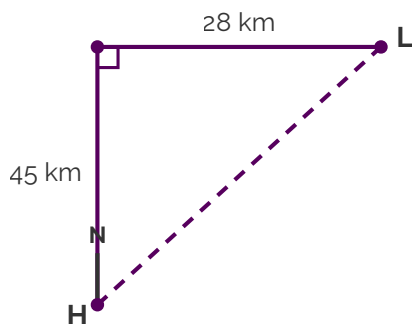
(b) Work out the extra amount Sami pays as a percentage of \$640. [2]

Answer

(c) The price of the phone has increased by 25% since last year. Work out last year's price. [2]

Answer

- 2 A boat sails 45 km due north from harbour H and then 28 km due east to a lighthouse L.



NOT TO SCALE

- (a) Calculate the direct distance HL. [3]

Answer

- (b) Calculate the bearing of L from H. [2]

Answer

- (c) Write down the bearing of H from L. [1]

Answer

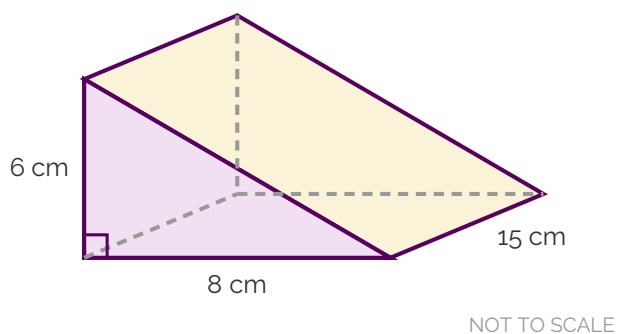
- 3 Two photographs are mathematically similar. The smaller photograph is 9 cm wide and 6 cm high. The larger photograph is 22.5 cm wide.

Work out the height of the larger photograph.

[2]

Answer

- 4 The diagram shows a triangular prism of length 15 cm. The cross-section is a right-angled triangle with sides 6 cm and 8 cm.



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

Answer

- (b) Calculate the length of the sloping edge of the cross-section. [2]

Answer

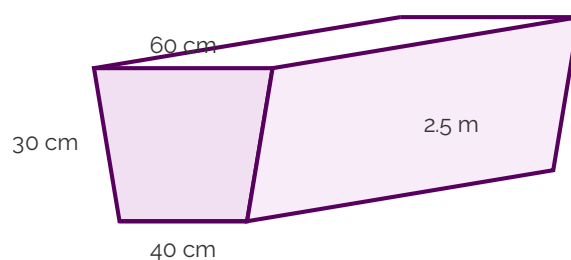
- (c) Calculate the total surface area of the prism. [3]

Answer

- (d) Write the volume of the prism in litres. [1]

Answer

- 5 A water trough is a prism. Its cross-section is a trapezium with parallel sides 60 cm and 40 cm and depth 30 cm. The trough is 2.5 m long.



NOT TO SCALE

- (a) Calculate the volume of the trough in litres. [3]

Answer

- (b) Water flows into the empty trough through a cylindrical pipe of radius 1.2 cm at a speed of 50 cm/s.

Calculate the time taken to fill the trough. Give your answer in minutes. [3]

Answer

- (c) A solid metal sphere of radius 6 cm is melted down and made into solid cones of radius 2 cm and height 5 cm.

Calculate the greatest number of complete cones that can be made. [4]

Answer

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. You may use a calculator. Give non-exact answers to 3 significant figures.

1 Round 7.4952 to 3 significant figures.

2 Work out $1\frac{2}{3} \times \frac{3}{10}$.

3 Write 56 000 000 in standard form.

4 Solve $3(x + 4) = 27$.

5 Increase 80 by 15%.

6 Factorise $x^2 - 9x + 14$.

7 Find the circumference of a circle with radius 4.5 cm.

8 Find one exterior angle of a regular octagon.

9 Two fair coins are thrown. Find $P(\text{two heads})$.

10 Find the median of 3, 8, 5, 12, 9, 6.

11 Write the equation of the line with gradient -2 and y-intercept 5.

12 $\tan x = 7/4$. Find x to 1 decimal place.

13 Simplify $6a^2b \times 3ab^3$.

14 Make t the subject of $v = u + at$.



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 0.078
- 2 $7/20$
- 3 0.0026
- 4 $x = 8$
- 5 42
- 6 $x^2 - 2x - 15$
- 7 28.8 cm^2
- 8 720°
- 9 0.65
- 10 9
- 11 3
- 12 13 cm
- 13 $4x^6$
- 14 36.9°

Unit 1 · Sheet A — Exam technique and command words

- 1 Write down
- 2 every step leading to $x = 7$
- 3 6.05
- 4 0.0406
- 5 39 000
- 6 18.00
- 7 37.5°
- 8 \$12.60
- 9 1
- 10 follow through
- 11 $9\pi \text{ cm}^2$
- 12 $3/4$
- 13 3.75
- 14 $x = 7$ or $x = -7$
- 15 5.2×10^{-4}
- 16 about 7 minutes (7.2)
- 17 15.0
- 18 $25\,000 \text{ cm}^2$

Unit 1 · Sheet B — Exam technique and command words

- 1 (a) $(6 - 2) \times 180 = 720$ M1; $720 \div 6 = 120$ A1 (or exterior $360 \div 6 = 60$, $180 - 60 = 120$) [2] (b) $3 \times 120^\circ = 360^\circ$ (angles at a point) B1 [1]
- 2 (a) she multiplied only the x by 3; the 4 must also be multiplied $(3x - 12)$ B1 [1] (b) $3x - 12 = 18$ or $x - 4 = 6$ M1; $x = 10$ A1 [2]
- 3 (a) $366 \div 52 (= 7.03\dots)$ M1; 8 A1 [2] (b) \$1480 B1ft ($185 \times$ their (a)) [1] (c) $1480 \div 366$ M1; \$4.04 A1 [2]
- 4 (a) $\pi \times 3.6^2 \times 11.5$ M1; 468 cm^3 (468.2...) A1 [2] (b) 470 B1ft [1] (c) 0.468 B1ft [1]
- 5 (a) $\sqrt{2^2 + 4^2} = \sqrt{20}$ M1; $\sqrt{20} = \sqrt{4 \times 5} = 2\sqrt{5}$ A1 (must show $\sqrt{4 \times 5}$ or $\sqrt{4 \times 5}$) [2] (b) $6 + 2\sqrt{5}$ B1 [1]
- 6 (a) $4.50 \div 6 = 0.75$ M1; $7.20 \div 10 = 0.72$ M1; Pack B (with both values) A1 — or compare 30 pens: \$22.50 and \$21.60 [3] (b) e.g. they only need 6 pens / it costs less money in total ($\$4.50 < \7.20) B1 [1]
- 7 (a) $50 \times 3 \div 0.2$ seen M1; 750 A1 [2] (b) 789 B1 (789.45...) [1]

Unit 2 · Sheet A — Non-calculator skills

- 1 1702
- 2 132
- 3 17.55
- 4 5.54
- 5 0.021
- 6 90
- 7 $14/15$
- 8 $7/12$
- 9 $3/5$
- 10 6
- 11 $4\frac{1}{6}$
- 12 12
- 13 21
- 14 -19
- 15 72
- 16 0.7
- 17 5
- 18 6
- 19 3
- 20 8000

Unit 2 · Sheet B — Non-calculator skills

- 1 $15/4 - 11/6$ M1; $45/12 - 22/12$ M1; $1\frac{11}{12}$ A1 [3]
2 3.4×2.35 M1; $34 \times 235 = 7990$ (complete written method) M1; \$7.99 A1 [3]
3 (a) $450 \div 6 (= 75)$ or $450 \times 10/6$ M1; 750 g A1 [2] (b) $180 \div 6 = 30$ ml per person and $1000 \div 30$ M1; 33 A1 [2]
4 $84 = 2^2 \times 3 \times 7$ and $90 = 2 \times 3^2 \times 5$ M1 (either); HCF = 6 A1; LCM: $2^2 \times 3^2 \times 5 \times 7$ M1; 1260 A1 [4]
5 $10\% = 64$ (or $1\% = 6.4$) M1; $35\% = 224$ (or $65\% = 416$ directly) M1; \$416 A1 [3]
6 (a) $4\sqrt{3} - 2\sqrt{3}$ M1; $2\sqrt{3}$ A1 [2] (b) $10\sqrt{5}/5$ M1; $2\sqrt{5}$ A1 [2] (c) $9 - 3\sqrt{2} + 3\sqrt{2} - 2$ M1; 7 A1 [2] (d) 27 B1 [1]
7 0.305, 0.35, 36%, $3/8$ B2 (B1 for converting to decimals 0.375 and 0.36, or three in the correct order) [2]

Unit 3 · Sheet A — Calculator skills and accuracy

- 1 3.21
2 15.7
3 35.0
4 5.35
5 0.616
6 5.48
7 34.0°
8 129
9 102
10 3073.14
11 7.94
12 1.33
13 9×10^3
14 3×10^{10}
15 3×10^{-7}
16 0.16
17 3 h 42 min
18 0.004 72

Unit 3 · Sheet B — Calculator skills and accuracy

- 1 (a) 9.5622363... B2 (B1 for 35.1625 or 3.6772... seen) [2] (b) 9.56 B1ft [1]
2 (a) $15 \times \sin 34$ M1; 8.39 A1 [2]
(b) $\tan y = 6.2/9.5$ M1; 33.1 A1 [2]
3 (a) 4800×1.026^7 M1; \$5744.77 A1 [2] (b) trials of 4800×1.026^n , e.g. $n = 8$ gives 5894.14, $n = 9$ gives 6047.38 M1; 9 A1 [2]
4 (a) $140/360 \times 2 \times \pi \times 8.5$ M1; 20.8 cm A1 [2] (b) 37.8 cm B1ft (their arc $\div 17$) [1] (c) $140/360 \times \pi \times 8.5^2$ M1; 88.3 cm² A1 [2]
5 (a) $5.97 \times 10^{24} \div 7.35 \times 10^{22}$ M1; 81.2 A1 [2] (b) $5.97 \times 10^{24} + 0.0735 \times 10^{24}$ M1; 6.04×10^{24} kg A1 (6.0435×10^{24}) [2]
6 (a) 3 h 48 min = 3.8 h B1; $342 \div 3.8$ M1; 90 km/h A1 [3] (b) 25 m/s B1ft [1]
7 8.35 B1; 8.45 B1 [2]

Unit 4 · Sheet A — Core Paper 1 practice paper

- 1 (a) 7045 B1 [1] (b) 37% B1 [1]
2 (a) 17 B1 [1] (b) 25 or 36 B1 [1] (c) 12 or 15 B1 [1] (d) 27 or 36 B1 [1]
3 (a) 46.07 B1 [1] (b) 46.1 B1 [1]
4 $3a + 4b$ B2 (B1 for one correct term) [2]
5 $11/12$ — M1 for common denominator, e.g. $8/12 + 3/12$; A1 $11/12$ [2]
6 $x = 67$ B1; angles on a straight line add up to 180° B1 [2]
7 (a) $8x - 20$ B1 [1] (b) $x = 5$ — M1 $3x = 15$; A1 [2] (c) $3(2y + 5)$ B1 [1]
8 $2^3 \times 3^2 \times 5$ (or $2 \times 2 \times 2 \times 3 \times 3 \times 5$) — M1 for a correct factor tree/ladder with at least two correct steps; A1 [2]
9 Amira \$36, Ben \$48 — M1 $84 \div 7 (= 12)$; A1 both [2]
10 36 — M1 e.g. $10\% = 24$ and $5\% = 12$; A1 [2]
11 (a) 21 B1 [1] (b) $4n + 1$ B2 (B1 for $4n + k$, $k \neq 1$) [2] (c) $4n + 1 = 99$ gives $n = 24.5$, not an integer (or terms are all 1 more than a multiple of 4; 97 and 101 are terms) B1 [1]
12 (a) $3/10$ B1 [1] (b) $8/10$ or $4/5$ B1 [1] (c) 20 B1 [1]
13 1200 — M1 $40 \times 6 \div 0.2$ seen; A1 1200 [2]

Unit 4 · Sheet B — Core Paper 1 practice paper

- 1 (a) $(-3, 2)$ B1 [1] (b) Image with vertices $(-1, 1)$, $(-4, 1)$, $(-4, 2)$, $(-2, 4)$, $(-1, 4)$ B2 (B1 for a reflection in a different vertical line, or correct shape with one vertex wrong) [2]
2 (a) 3 B1 [1] (b) 7 B1 [1] (c) 10 B1 [1] (d) 7 — M1 $49 \div 7$; A1 [2]
3 $y = 70$ — M1 $(180 - 40) \div 2$; A1 [2]
4 10 cm — M1 $6^2 + 8^2 (= 100)$; A1 [2]
5 (a) $x < 4$ — M1 $5x < 20$; A1 [2] (b) $-2, -1, 0, 1, 2$ B2 (B1 for four correct and none wrong, or five correct and one extra) [2]
6 $3\frac{1}{2}$ — M1 $7/3 \times 3/2$; M1 $21/6$ or $7/2$; A1 $3\frac{1}{2}$ [3]
7 100π cm² — M1 $\pi \times 10^2$; A1 [2]
8 $x = 4$, $y = 3$ — M1 adding to eliminate y ($3x = 12$) or correct substitution; A1 $x = 4$; A1 $y = 3$ [3]
9 148.5 cm² — M1 for one correct rectangle area (e.g. $9 \times 11 = 99$ or $18 \times 5.5 = 99$ or $9 \times 5.5 = 49.5$); M1 complete method; A1 148.5 [3]
10 (a) 108° — M1 $(5 - 2) \times 180 \div 5$ or $180 - 360/5$; A1 [2] (b) 5 B1 [1]
11 15% — M1 $6/40 \times 100$; A1 [2]

Unit 5 · Sheet A — Core Paper 3 practice paper

- 1 (a) \$46.20 B1 [1] (b) 35.1% (35.06...) — M1 $(5.20 - 3.85)/3.85 \times 100$; A1 [2] (c) 16 — M1 $48 \div 12 \times 4$; A1 [2] (d) 17 25 (5.25 pm) B1 [1]
2 (a) 11.7733333333 (accept 11.773...) B2 (B1 for 26.49 or 2.25 seen) [2] (b) 12 B1 ft [1]
3 (a) 1 B1 [1] (b) 1.5 — M1 15th and 16th values identified (1 and 2); A1 [2] (c) 1.667 (= $50/30$) — M1 $\Sigma fx = 50$; M1 $\div 30$; A1 [3] (d) 84° — M1 $7/30 \times 360$; A1 [2]
4 (a) 6.99 (6.989...) — M1 $12.5 \times \sin 34$; A1 [2] (b) 10.4 cm (10.36...) — M1 $12.5 \times \cos 34$ or $\sqrt{12.5^2 - x^2}$; A1 [2] (c) 36.2 cm² (36.2...) — M1 $1/2 \times AB \times BC$; A1 ft [2]
5 (a) $x = 4.5$ — M1 $10x - 15$; M1 $6x = 27$; A1 [3] (b) $(x + 3)(x + 4)$ B2 (B1 for $(x + a)(x + b)$ with $ab = 12$ or $a + b = 7$) [2] (c) $x = -3$, $x = -4$ B1 ft [1] (d) $a = (v - u)/t$ — M1 $at = v - u$; A1 [2]

Unit 5 · Sheet B — Core Paper 3 practice paper

- 1** (a) y values: 5, 0, -3, -4, -3, 0, 5 — B2 for the three missing values 0, -3, 5 (B1 for two correct) **[2]** (b) Smooth parabola through all 7 points B3 ft (B2 ft for 6 or 7 correct plots; B1 ft for 4 or 5) **[3]** (c) $x = -1$, $x = 3$ B2 (B1 each) **[2]** (d) $x = 1$ B1 **[1]**
- 2** (a) 763 cm^3 (763.4...) — $M1 \pi \times 4.5^2 \times 12$; A1 **[2]** (b) 467 cm^2 (466.5...) — $M1 2\pi \times 4.5 \times 12$; $M1 2 \times \pi \times 4.5^2$; A1 **[3]** (c) 0.763 litres (ft their (a) $\div 1000$) B1 **[1]**
- 3** (a) \$320.00 — $M1 2500 \times 0.032 \times 4$; A1 **[2]** (b) \$2813.77 — $M1 2500 \times 1.03^4$; A1 **[2]** (c) Hamid, by \$6.23 (Hamid \$2820.00, Nora \$2813.77) B1 ft **[1]**
- 4** (a) Translation B1 by column vector $\begin{pmatrix} -6 \\ -4 \end{pmatrix}$ B1 **[2]** (b) Rotation B1; 90° anticlockwise B1; centre (0, 0) B1 **[3]** (c) Vertices (2, 2), (6, 2), (6, 4), (2, 6) B2 (B1 for correct size and orientation, wrong position) **[2]**
- 5** (a) $AnB = \{3, 9, 15\}$; A only = $\{6, 12\}$; B only = $\{1, 5, 7, 11, 13\}$; outside = $\{2, 4, 8, 10, 14\}$ — B3 (B2 for 13–14 numbers correctly placed; B1 for 11–12) **[3]** (b) 10 B1 ft **[1]** (c) $2/15$ B1 ft **[1]**
- 6** (a) 18 km B1 **[1]** (b) 15 min B1 **[1]** (c) 48 km/h — $M1 12 \div 15 \text{ min}$ (or 0.25 h); A1 **[2]**
- 7** (a) H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6 B2 (B1 for 9 or more correct) **[2]** (b) $3/12 = 1/4$ B1 ft **[1]**

Unit 6 · Sheet A — Extended Paper 2 practice paper

- 1** $4\frac{7}{12}$ — $M1 7/4 + 17/6$; $M1 21/12 + 34/12$; A1 **[3]**
- 2** (a) 9 B1 **[1]** (b) $1/4$ B1 **[1]** (c) $3/2$ (or $1\frac{1}{2}$) — $M1 (27/8)^{1/3}$ or $2/3$ seen; A1 **[2]**
- 3** (a) $8\sqrt{2}$ — $M1 5\sqrt{2}$ or $3\sqrt{2}$; A1 **[2]** (b) $2\sqrt{3}$ — $M1 6\sqrt{3}/3$; A1 **[2]**
- 4** (a) $6xy(2x - 3y)$ B2 (B1 for a correct partial factorisation) **[2]** (b) $(3a - 5b)(3a + 5b)$ B2 (B1 for $(3a \pm 5b)(3a \pm 5b)$ with wrong signs) **[2]** (c) $(2x - 3)(x + 5)$ B2 (B1 for one correct bracket) **[2]**
- 5** -2, -1, 0, 1, 2, 3 — $M1 -3 < x$; $M1 x \leq 3$; A1 list **[3]**
- 6** $x = 2$, $y = -3.5$ — $M1$ correct method to eliminate one variable (e.g. $13x = 26$); A1 $x = 2$; A1 $y = -3.5$ **[3]**
- 7** $n^2 + 2n$ B2 (B1 for $n^2 + bn + c$ with second difference 2 identified) **[2]**
- 8** 3 — $M1 y = k/x^2$; $M1 k = 48$; A1 **[3]**
- 9** (a) $12\pi \text{ cm}^2$ — $M1 120/360 \times \pi \times 6^2$; A1 **[2]** (b) $4\pi + 12 \text{ cm}$ — $M1 120/360 \times 2\pi \times 6$ (= 4π); A1 **[2]**
- 10** $13/28$ — $M1 5/8 \times 4/7$ or $3/8 \times 2/7$; $M1$ sum of both products; A1 **[3]**
- 11** $(2x - 5)/((x + 2)(x - 1))$ — $M1$ common denominator $(x + 2)(x - 1)$; $M1 3(x - 1) - (x + 2)$; A1 **[3]**

Unit 6 · Sheet B — Extended Paper 2 practice paper

- 1** $2 \pm \sqrt{5}$ — $M1 (x - 2)^2 = 5$; $M1 x - 2 = \pm\sqrt{5}$; A1 **[3]**
- 2** (a) -2 B1 **[1]** (b) $y = -2x + 1$ — $M1$ substituting a point into $y = -2x + c$; A1 **[2]** (c) $6\sqrt{5}$ — $M1 \sqrt{6^2 + 12^2} = \sqrt{180}$; A1 **[2]** (d) (1, -1) B1 **[1]** (e) $y = 1/2 x - 3/2$ (or $2y = x - 3$) — $M1$ gradient $1/2$; A1 **[2]**
- 3** (a) 0.8, 2.4, 1.5, 0.5 B2 (B1 for two or three correct) **[2]** (b) 17.5 or 17 or 18 — $M1 1/2 \times 15 + 10$; A1 **[2]**
- 4** (a) 62° B1; angle at the centre is twice the angle at the circumference B1 **[2]** (b) 77° B1 (opposite angles of a cyclic quadrilateral add up to 180°) **[1]**
- 5** (a) $1/2 \mathbf{a} + 1/2 \mathbf{b}$ — $M1 \mathbf{a} + 1/2(\mathbf{b} - \mathbf{a})$; A1 **[2]** (b) $-\mathbf{a} + 2/3 \mathbf{b}$ — $M1 \mathbf{OP} = 2/3 \mathbf{b}$; A1 **[2]**
- 6** (a) Correct shape through (0, 0), (90, 1), (180, 0), (270, -1), (360, 0) B2 (B1 for correct shape with one error) **[2]** (b) 210° , 330° B2 (B1 each) **[2]**
- 7** (a) 13 — $M1 g(2) = 5$; A1 **[2]** (b) $(x + 2)/3$ — $M1 x = 3y - 2$ or $(y + 2)/3$; A1 **[2]** (c) $9x^2 - 12x + 5$ — $M1 (3x - 2)^2 + 1$; A1 **[2]**
- 8** (a) $3x^2 - 12x + 9$ B2 (B1 for two correct terms) **[2]** (b) (1, 6) and (3, 2) — $M1$ their $dy/dx = 0$; $M1 3(x - 1)(x - 3) = 0$ or $x = 1$, $x = 3$; A1 (1, 6); A1 (3, 2) **[4]** (c) (1, 6) maximum, (3, 2) minimum — $M1$ second derivative $6x - 12$ (or gradient either side); A1 **[2]**

Unit 7 · Sheet A — Extended Paper 4 practice paper

- 1** (a)(i) \$800 — $M1 2400 \div 12 \times 4$; A1 **[2]** (a)(ii) \$711.11 — $M1 800 \div 1.125$; A1 **[2]** (b) 3.5 — $M1 3000 \times (1 + r/100)^5 = 3563.06$; $M1$ fifth root of 1.18769; A1 **[3]** (c)(i) \$11767.04 — $M1 18\,500 \times 0.86^3$; A1 **[2]**
- 2** (a) 2.45 kg — $M1$ midpoints 0.5, 1.5, 2.5, 3.5, 5; $M1 \Sigma f_x$ (= 294); $M1 \div 120$; A1 **[4]** (b) 14, 46, 84, 108, 120 B2 (B1 for two or three correct) **[2]** (c) Points plotted at (1, 14), (2, 46), (3, 84), (4, 108), (6, 120) and (0, 0) B2 ft (B1 for 4 correct); joined with a smooth curve or straight lines B1 **[3]** (d) median $\approx 2.37 \text{ kg}$ (accept 2.3–2.45) B1; IQR $\approx 1.75 \text{ kg}$ (accept 1.6–1.9) B1 **[2]**
- 3** (a) 17.90 cm — $M1 9.4^2 + 12.6^2 - 2 \times 9.4 \times 12.6 \times \cos 108$; $M1 \sqrt{\quad}$; A2 (A1 for $AC^2 = 320.32$) **[4]** (b) 13.2 cm — $M1 CD/\sin 41 = AC/\sin 63$; $M1$ rearranged; A1 ft **[3]** (c) 56.3 cm^2 — $M1 1/2 \times 9.4 \times 12.6 \times \sin 108$; A1 **[2]**
- 4** (a) -7, 2, -2 B2 (B1 for two correct) **[2]** (b) Correct smooth curve through all 7 points B4 ft (B3 ft for 6 or 7 correct points plotted; B2 ft for 4 or 5; B1 ft for 2 or 3) **[4]** (c) -2.60, 0.34, 2.26 (accept ± 0.1) B2 (B1 for two correct) **[2]** (d) line $y = 2x$ drawn B1; $x = -2.95$, 0.25, 2.69 (accept ± 0.1) B2 (B1 for two correct) **[3]**

Unit 7 · Sheet B — Extended Paper 4 practice paper

- 1** (a) 829.4 cm^3 — $M1 2/3 \times \pi \times 6^3$; $M1 1/3 \times \pi \times 6^2 \times 10$; A1 **[3]** (b) 446.0 cm^2 — $M1$ slant height $\sqrt{6^2 + 10^2}$ (= 11.662); $M1 \pi \times 6 \times l$; $M1 2 \times \pi \times 6^2$; A1 **[4]** (c) 6.47 kg — $M1$ their $V \times 7.8$; A1 ft **[2]**
- 2** (a) Vertices (2, 1), (2, 4), (4, 4) B2 (B1 for reflection in $y = -x$ or two vertices correct) **[2]** (b) Vertices (2, -1), (2, -4), (4, -4) B2 (B1 for correct rotation, wrong centre/direction) **[2]** (c) Enlargement B1; scale factor $1/2$ B1; centre (-2, -6) B1 **[3]**
- 3** (a) 0.94 — $M1 0.7 + 0.3 \times 0.8$; A1 **[2]** (b) 0.46 — $M1 0.7 \times 0.4$ or 0.3×0.6 ; $M1$ sum of two products; A1 **[3]** (c) $14/23$ (= 0.609) — $M1 0.28 \div \text{their } 0.46$; A1 **[2]**
- 4** (a) -0.59, 2.26 — $B1 \sqrt{(25 + 48)} = \sqrt{73}$; $M1 (5 \pm \sqrt{73})/6$; A1 A1 **[4]** (b) ± 3.61 — $M1 4(x + 2) - 3(x - 1) = (x - 1)(x + 2)$; $M1 x + 11 = x^2 + x - 2$; $A1 x^2 = 13$; A1 ± 3.61 **[4]** (c) 11 and 13 — $M1 n^2 + (n + 2)^2 = 290$; $M1 (n - 11)(n + 13) = 0$ or $n^2 + 2n - 143 = 0$; A1 **[3]**
- 5** (a) 10.25 cm — $M1 8^2 + 5^2 + 4^2$; $M1 \sqrt{\quad}$; A1 **[3]** (b) 23.0° — $M1 \sin^{-1}(4/AG)$ or $\tan^{-1}(4/\sqrt{89})$; A1 **[2]**

Unit 8 · Sheet A — Mixed problem solving

- 1 66 cm^2
- 2 48
- 3 \$30
- 4 81
- 5 294 cm^2
- 6 \$30.94
- 7 9
- 8 80°
- 9 12 cm
- 10 08 36
- 11 78.5 cm^2
- 12 20 m/s
- 13 28 122
- 14 120

Unit 8 · Sheet B — Mixed problem solving

- 1
(a) \$690.00 — M1 0.15×640 (= 96); M1 12×49.50 (= 594); A1 [3]
(b) 7.81% (7.8125%) — M1 (their total – 640)/640 $\times 100$; A1 [2] (c) \$512.00 — M1 $640 \div 1.25$; A1 [2]
- 2 (a) 53.0 km (53.00...) — M1 $45^2 + 28^2$; M1 $\sqrt{}$; A1 [3] (b) 31.9° (31.89...; bearing 031.9°) — M1 $\tan^{-1}(28/45)$; A1 [2] (c) 211.9° (B1 ft their (b) + 180) [1]
- 3 15 cm — M1 $22.5 \div 9$ (= 2.5); A1 [2]
- 4 (a) 360 cm^3 — M1 $1/2 \times 6 \times 8 \times 15$; A1 [2] (b) 10 cm — M1 $\sqrt{6^2 + 8^2}$; A1 [2] (c) 408 cm^2 — M1 2×24 ; M1 $(6 + 8 + 10) \times 15$; A1 [3]
(d) 0.36 litres B1 ft [1]
- 5 (a) 375 litres — M1 $(60 + 40)/2 \times 30$ (= 1500); M1 $\times 250$; A1 [3]
(b) 27.6 min — M1 $\pi \times 1.2^2 \times 50$ (= $226.2 \text{ cm}^3/\text{s}$); M1 their volume $\div$ rate $\div 60$; A1 [3] (c) 43 — M1 $4/3 \times \pi \times 6^3$; M1 $1/3 \times \pi \times 2^2 \times 5$; M1 division (= 43.2); A1 [4]

End-of-book check

- 1 7.50
- 2 $1/2$
- 3 5.6×10^7
- 4 $x = 5$
- 5 92
- 6 $(x - 2)(x - 7)$
- 7 28.3 cm
- 8 45°
- 9 $1/4$
- 10 7
- 11 $y = -2x + 5$
- 12 60.3°
- 13 $18a^3b^4$
- 14 $t = (v - u)/a$