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MATHEMATICS **0580/31**

Paper 3 Calculator (Core) **May/June 2026**

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You should use a scientific calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

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List of formulas

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

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1 The table shows a shopping bill for three items.

item	cost per kg	number of kg	total
potatoes	\$2.18	3.5	\$7.63
oranges	\$1.48	6	\$ 8.88
onions	\$ 2.45	5.2	\$ 12.74
		total cost	\$29.25

Complete the table.

Fill the gaps

$1.48 \times 6 = 8.88$

$29.25 - 7.63 - 8.88 = 12.74$

$12.74 \div 5.2 = 2.45$

Examii Insight

01 Fill the gaps
- Total = cost per kg × number of kg.
- The three totals add to \$29.25: subtract the two you know.
- Cost per kg = total ÷ kg.

[3]

2 **(a)** Write $7 \times 7 \times 7 \times 7 \times 7 \times 7$ as a power of 7.

six 7s multiplied

Examii Insight 7 × 7 × … six times = 7 to the power 6.

7^6 ..... [1]

(b) Calculate 17.4^2.

$17.4 \times 17.4 = 302.76$

Examii Insight Squared means multiply the number by itself.

302.76 ..... [1]

3 Arya changes 250 pounds into dollars.
The exchange rate is 1 pound = \$1.26 .

Calculate the amount that Arya receives.

Multiply by the rate

$250 \times 1.26 = 315$

$\therefore$ \$315

Examii Insight

01 Multiply by the rate
- 1 pound gives \$1.26, so 250 pounds give 250 × 1.26.

\$ 315 ..... [1]

4 Find 18% of \$65.

Percentage of an amount

$\frac{18}{100} \times 65 = 11.70$

$\therefore$ \$11.70

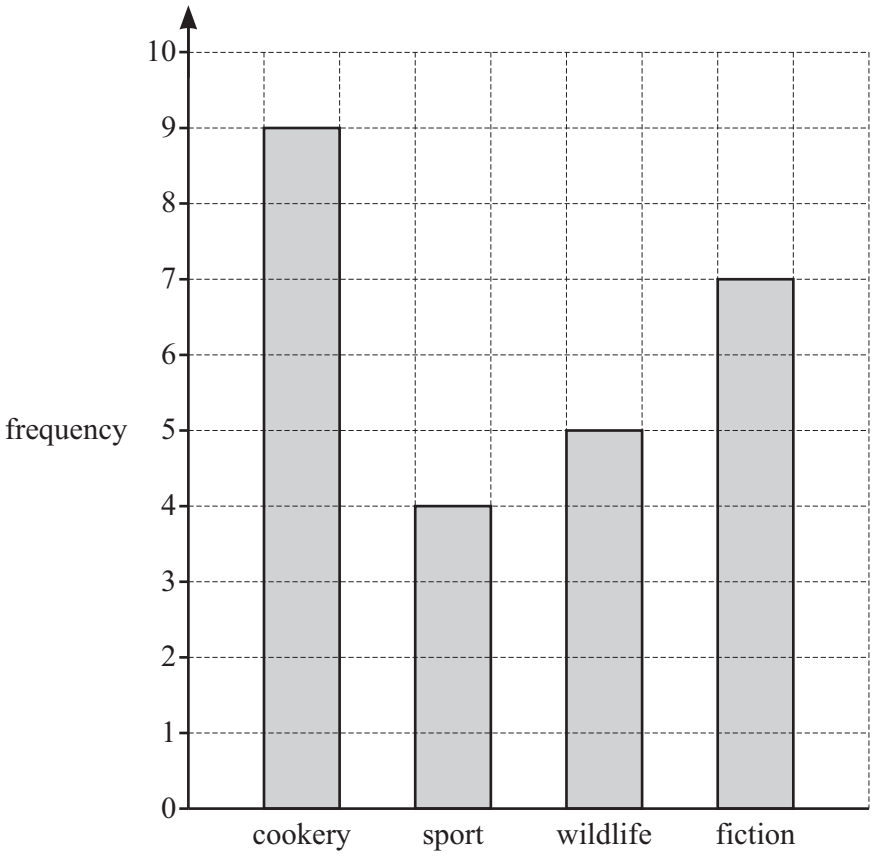
Examii Insight

01 Percentage of an amount
- 18% means 18 out of 100. Money: write 2 decimal places.

\$ 11.70 ..... [1]

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5 The bar chart shows the number of each type of book sold in a shop on one day.



Work out the percentage of books sold that are cookery.

Read the bars, then percentage

$9 + 4 + 5 + 7 = 25$

$\frac{9}{25} \times 100 = 36$

$\therefore$ 36%

Examii Insight

01 Read the bars, then percentage
- Cookery 9, sport 4, wildlife 5, fiction 7: total 25.
- Cookery ÷ total, then × 100.

.....36..... % [3]

6 Write these numbers in order, starting with the smallest.

$\sqrt[3]{0.1}$ $\frac{4}{9}$ 45% 0.443

Change all to decimals

$\sqrt[3]{0.1} = 0.464\ldots$, $\frac{4}{9} = 0.444\ldots$, $45\% = 0.45$

$\therefore$ 0.443, $\frac{4}{9}$, 45%, $\sqrt[3]{0.1}$

Examii Insight

01 Change all to decimals
- Use your calculator for the cube root.
- Compare digit by digit after the decimal point; smallest first.

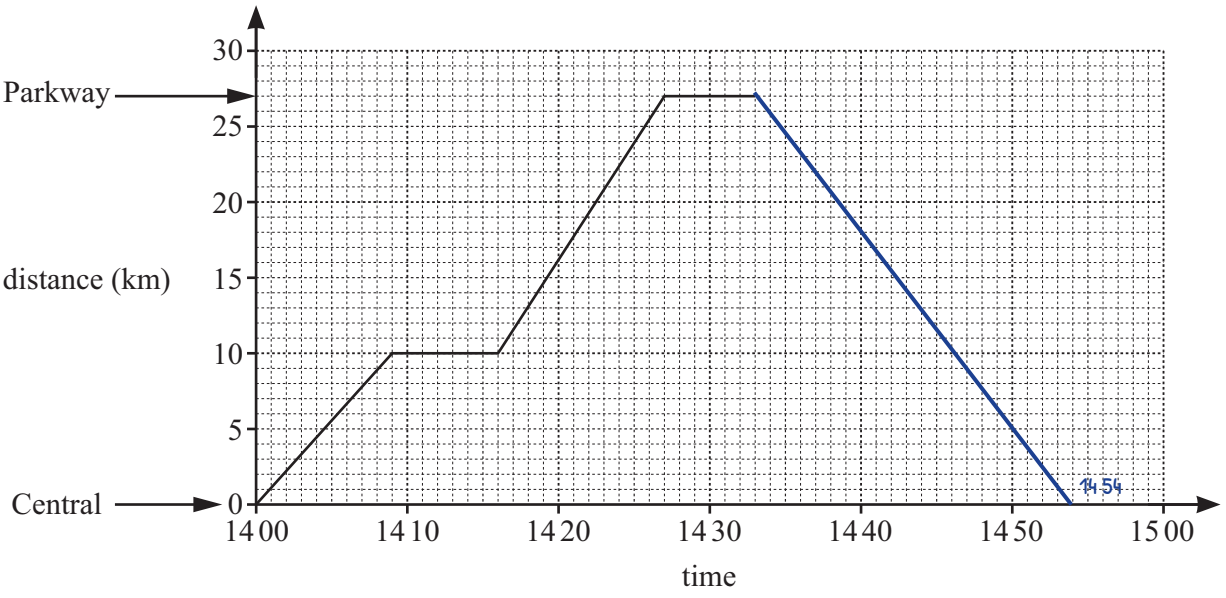
0.443 < $\frac{4}{9}$ < 45% < $\sqrt[3]{0.1}$ [2]

smallest

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7 The travel graph shows the journey of a train from Central station to Parkway station.



(a) For how many minutes does the train stop between Central and Parkway?

flat from 14 10 to 14 17

Examii Insight A horizontal line = the train is not moving.

7 ..... min [1]

(b) Write down the time the train arrives at Parkway.

reaches 27 km at 14 27

Examii Insight Parkway is at 27 km.

14 27 ..... [1]

(c) The train leaves Parkway at 14 33 and returns to Central at a constant speed.
The return journey takes 21 minutes.

Complete the graph to show this return journey.

Return line

14 33 + 21 min = 14 54

Rule a line from (14 33, 27) to (14 54, 0).

Examii Insight

01 Return line

- Constant speed → one straight line.
- Back at Central means distance 0.

[1]

8 Solve.

(a) $6+x=2$

$6-6+x=2-6 \Rightarrow x=-4$

Examii Insight –6 on the left, and to be fair –6 on the right too.

$x =$ -4 ..... [1]

(b) $5x+2=18$

Balance method

$5x+2-2=18-2$

$5x=16$

$5x \div 5 = 16 \div 5$

$\therefore x = 3.2$

Examii Insight

01 Balance method

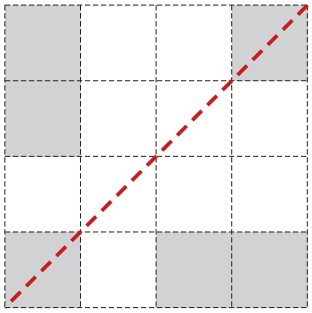
- –2 on the left, and to be fair –2 on the right too.
- 5x means 5 × x, so ÷5 on both sides.

$x =$ 3.2 ..... [2]

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9 (a) (i)



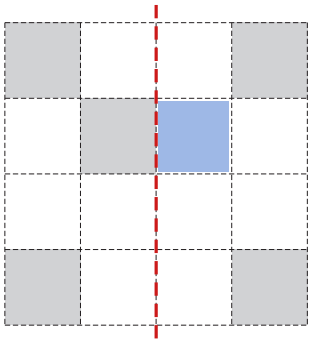
Examii Insight

01 Diagonal mirror

- The pattern folds onto itself along the diagonal from top-right to bottom-left (drawn).

On the diagram, draw the line of symmetry. [1]

(ii)



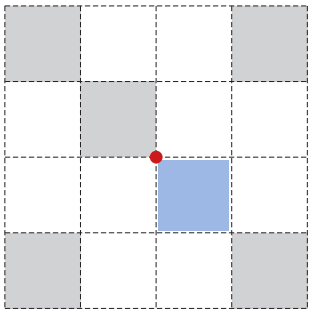
Examii Insight

01 Make a vertical mirror

- Shade the square in row 2, column 3 (shown).
- Now the left half matches the right half: one vertical line of symmetry.

On the diagram, shade **one** more square so that it has **one** line of symmetry. [1]

(b)



Examii Insight

01 Half-turn

- Turn the grid 180°: the square in row 2, column 2 lands on row 3, column 3.
- Shade row 3, column 3 (shown) → rotational symmetry order 2.

On the diagram, shade **one** more square so that it has rotational symmetry of order 2. [1]

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10 The table shows how 40 students travel to school.

type of transport	frequency	pie chart sector angle
bus	8	72°
car	15	135°
walk	17	153°

(a) Complete the table.

Degrees for one student

$\frac{360}{40} = 9°$

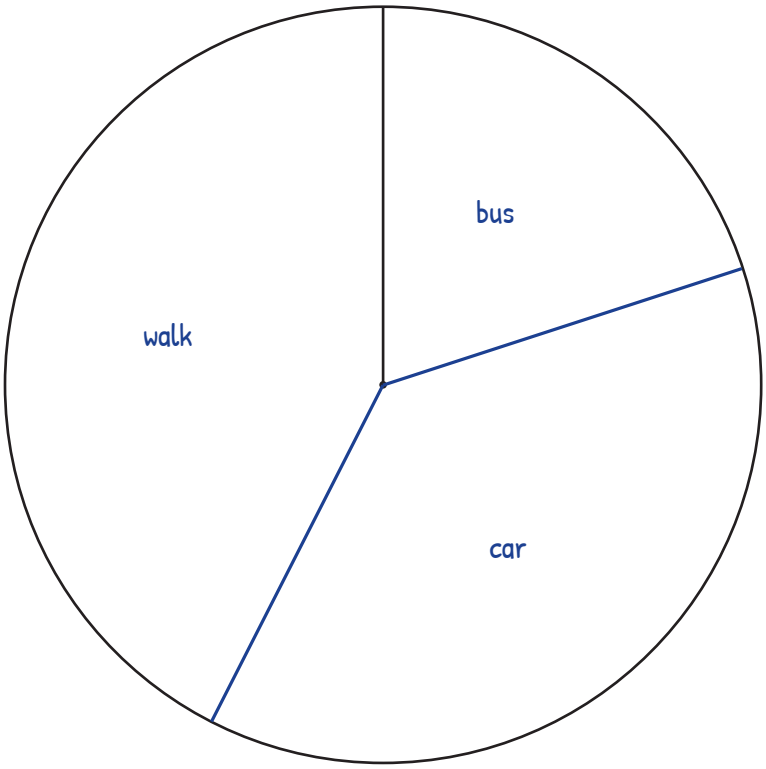
$8 \times 9 = 72,\ 15 \times 9 = 135,\ 17 \times 9 = 153$

Examii Insight

01 Degrees for one student
- A full circle is 360°, shared by 40 students.
- Check: 72 + 135 + 153 = 360 ✓

[2]

(b) Complete the pie chart.



Examii Insight

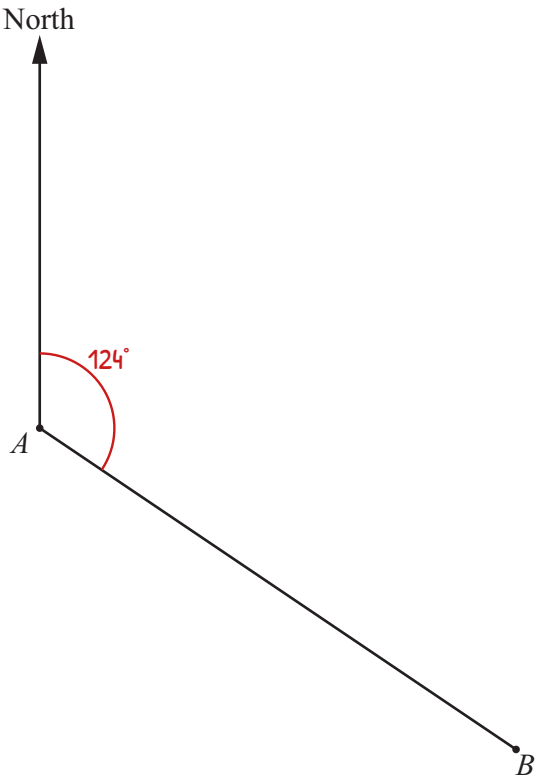
01 Draw the sectors
- Put the protractor on the line already drawn.
- Measure 72° (bus), then 135° (car); the rest is walk (153°).
- Label each sector.

[2]

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11 The scale diagram shows the positions of town A and town B.
The scale is 1 cm represents 15 km.



scale : 1 cm to 15 km

(a) Measure the bearing of town B from town A.

measure clockwise from North at A

Examii Insight Bearings are measured clockwise from North, 3 figures. Printing can change the scale: measure on your own paper.

124° [1]

(b) Find the actual distance AB.

AB = 7.6 cm; 7.6 × 15 = 114

Examii Insight Measure AB with a ruler, then × 15 km. Printing may alter the scale.

114 km [2]

12 Write one of the symbols $<$, $>$ or $=$ in each statement to make it correct.

$\frac{5}{8}$ ..... = ... 62.5%

0.2^2 ..... < 0.4

$\frac{2}{3}$ ..... < 0.67

[2]

Change to decimals

$\frac{5}{8} = 0.625 = 62.5\%$

$0.2^2 = 0.04 < 0.4$

$\frac{2}{3} = 0.666\ldots < 0.67$

Examii Insight

01 Change to decimals

- Write both sides as decimals, then compare.
- $0.2^2 = 0.2 \times 0.2 = 0.04$, not 0.4.

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13 Put **one** pair of brackets into each calculation to make it correct.

(a) $10 + 12 - 8 \times 5 = 30$ [1]

(b) $10 + 20 \times 7 \div 5 = 30$ [1]

14 Write down the reciprocal of $\frac{5}{7}$.

$1 \div \frac{5}{7} = \frac{7}{5}$

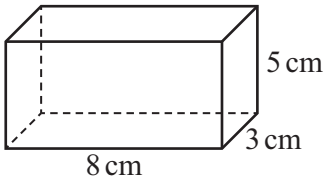
Examii Insight Turn the fraction upside down.

Examii Insight $10 + (12 - 8) \times 5 = 10 + 20 = 30$ ✓

Examii Insight $(10 + 20 \times 7) \div 5 = 150 \div 5 = 30$ ✓

$\frac{5}{}$ [1]

15 **(a)** The diagram shows a cuboid.



NOT TO SCALE

Calculate the surface area of the cuboid.

Three pairs of faces

$8 \times 5 = 40$, $8 \times 3 = 24$, $5 \times 3 = 15$

$2(40 + 24 + 15) = 158$

$\therefore$ 158 cm^2

Examii Insight

01 Three pairs of faces

- A cuboid has 6 faces in 3 matching pairs.
- Find one of each, add, then double.

158 cm^2 [3]

(b) A sphere has a radius of 6.4 cm.

Calculate the volume of the sphere.

Volume of a sphere

$V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi \times 6.4^3$

$= 1098.07\ldots$

$\therefore$ 1098 cm^3

Examii Insight

01 Volume of a sphere

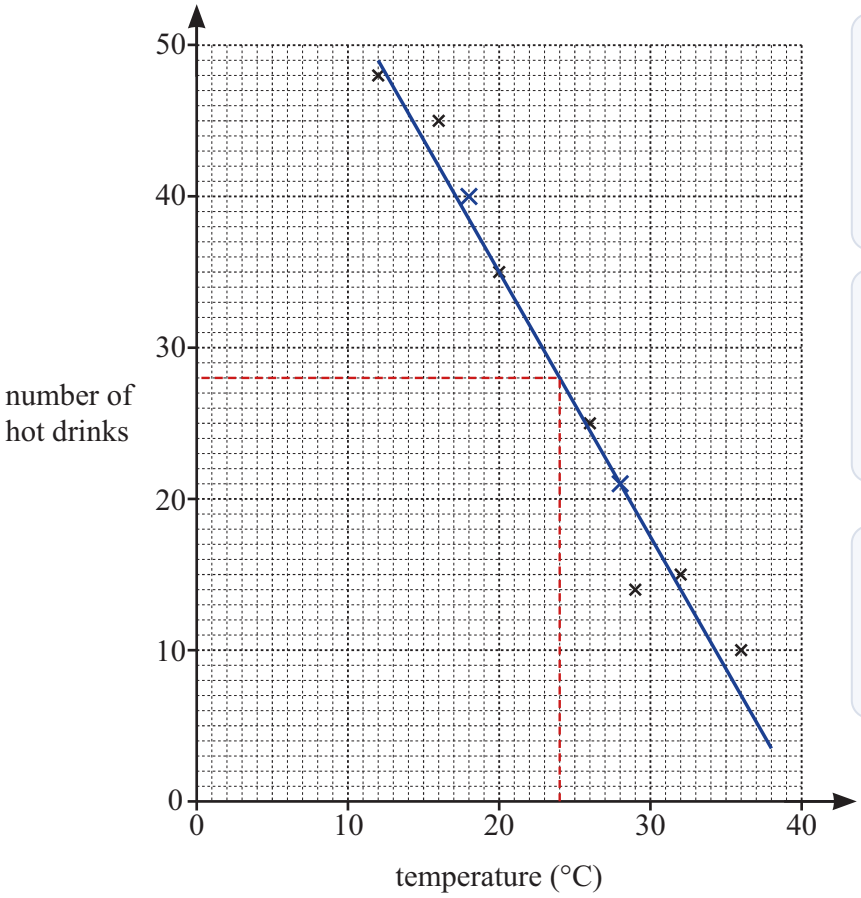
- Formula from the list on page 2.
- Cube the radius first: $6.4^3 = 262.144$.

1098 cm^3 [2]

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16 The scatter diagram shows the number of hot drinks sold by a café each day and the average temperature for that day.



Examii Insight

01 Plot
- (18, 40): go along to 18, up to 40.
- (28, 21): along to 28, up to 21.
- Mark each with a small cross.

Examii Insight

01 Line of best fit
- One ruled straight line through the middle of the points.
- About the same number of points above and below.

Examii Insight

01 Read from your line
- Go up from 24 °C to your line, then across to the number of drinks (about 28).

(a) These are the results for two more days.

temperature (°C)	18	28
number of hot drinks sold	40	21

Plot this information on the scatter diagram. [1]

(b) What type of correlation is shown in the scatter diagram?

as temperature goes up, drinks go down

Examii Insight Points go down from left to right → negative.

Negative ..... [1]

(c) (i) On the scatter diagram, draw a line of best fit. [1]

(ii) One day the average temperature was 24 °C.

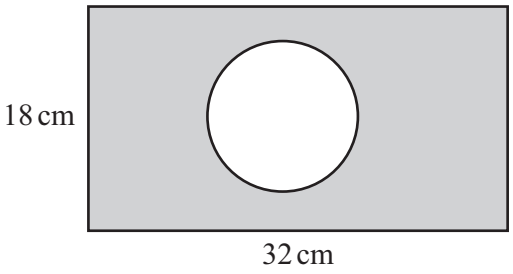
Use your line of best fit to estimate the number of hot drinks sold.

28 ..... [1]

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17 The diagram shows a circle inside a rectangle.



NOT TO SCALE

The shaded area is $450\,\text{cm}^2$.

Find the radius of the circle.

Area of the rectangle

$18 \times 32 = 576$

Area of the circle

$576 - 450 = 126$

Balance to find r

$\pi r^2 = 126$

$r^2 = \frac{126}{\pi} = 40.10\ldots$

$r = \sqrt{40.10\ldots} = 6.33$

$\therefore\ r = 6.33\ \text{cm}$

Examii Insight

01 Area of the rectangle
- Length × width.

02 Area of the circle
- Shaded = rectangle – circle, so circle = rectangle – shaded.

03 Balance to find r
- ÷π on both sides, then square root both sides.

.....6.33..... cm [4]

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18 **(a)** Write down the smallest integer that satisfies $x > -8$.

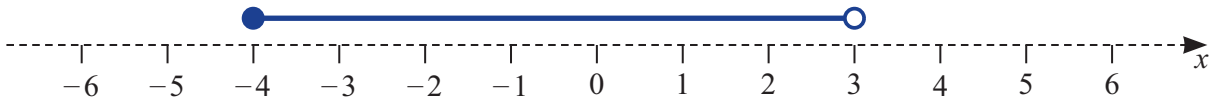
$-7, -6, \ldots$ are > -8

Examii Insight -8 itself is not allowed; the next integer up is -7.

-7 ..... [1]

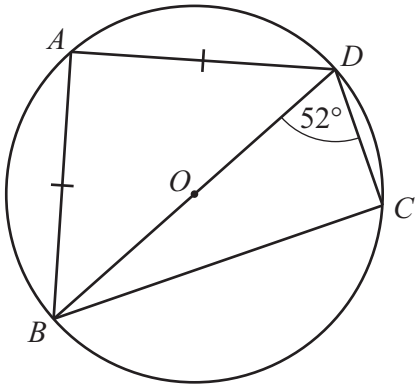
(b) Represent the inequality $-4 \leqslant x < 3$ on the number line.

Examii Insight Filled circle at -4 ($\leq$: included), open circle at 3 ($<$: not included), joined by a line.



[2]

19



NOT TO SCALE

Angle in a semicircle

$\angle BAD = 90°$

$\angle BCD = 90°$

Isosceles triangle ABD

$\angle ABD = \frac{180 - 90}{2} = 45°$

Examii Insight

01 Angle in a semicircle
- BD is a diameter, so angles at A and C are 90°.

02 Isosceles triangle ABD
- AB = AD, so the base angles are equal.

A, B, C and D are points on the circumference of a circle with centre O.
$AB = AD$ and angle $BDC = 52°$.
BD is a diameter of the circle.

Calculate angle ABC.

Triangle BCD

$\angle DBC = 180 - 90 - 52 = 38°$

$\angle ABC = 45 + 38 = 83°$

$\therefore$ $83°$

Examii Insight

03 Triangle BCD
- Angles in a triangle add to 180°.
- ABC = ABD + DBC.

angle $ABC =$ $83°$ ..... [3]

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20 **(a)** $P = 5x + 4y$

Find the value of x when $P = 18$ and $y = -3$.

Substitute, then balance

$18 = 5x + 4(-3)$

$18 + 12 = 5x - 12 + 12$

$30 = 5x$

$x = 30 \div 5$

$\therefore\ x = 6$

Examii Insight

01 Substitute, then balance
- Put P = 18 and y = –3 into the formula.
- To remove –12 we +12 on the right, and to be fair +12 on the left too; then ÷5.

$x =$ ..... 6 ..... [3]

(b) Factorise.

$$6x^2 + 12x$$

Highest common factor

$6x^2 + 12x = 6x(x + 2)$

$\therefore\ 6x(x + 2)$

Examii Insight

01 Highest common factor
- Both terms share 6 and x → take out 6x.
- Check: $6x \times x + 6x \times 2 = 6x^2 + 12x$ ✓

..... 6x(x + 2) ..... [2]

21 Calculate $(8.7 \times 10^8) + (2.4 \times 10^7)$.

Write your answer in standard form.

Add

870 000 000 + 24 000 000 = 894 000 000

$\therefore\ 8.94 \times 10^8$

Examii Insight

01 Add
- Write both as ordinary numbers, add, then put back in standard form.
- Standard form: a number from 1 to 10 × a power of 10.

..... 8.94×10^8 ..... [2]

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22 Joseph invests $36 000 at a rate of 6.2% per year compound interest.

Calculate the total interest earned at the end of 4 years.

Compound interest

$36\,000 \times \left(1 + \frac{6.2}{100}\right)^4 = 45\,793.16$

Interest only

$45\,793.16 - 36\,000 = 9793.16$

$\therefore$ $9793.16

Examii Insight

01 Compound interest
- Each year the amount is × 1.062. Four years → power 4.

02 Interest only
- Interest = final amount − amount invested.

$ 9793.16 [3]

23 Calculate the interior angle of a regular pentagon.

Exterior angle first

$\frac{360}{5} = 72$

$180 - 72 = 108$

$\therefore$ 108°

Examii Insight

01 Exterior angle first
- Exterior angles of a polygon add to 360°.
- Interior + exterior = 180°.

108° [2]

24 Ali drives 56 km at an average speed of 48 km/h.
He then drives for 30 minutes at 54 km/h.

Calculate the average speed for his whole journey.

Time for the first part

$\frac{56}{48} = 1.1\dot{6}$ h

Distance for the second part

$0.5 \times 54 = 27$ km

Average speed

$\frac{56 + 27}{1.1\dot{6} + 0.5} = \frac{83}{1.66\dot{6}} = 49.8$

$\therefore$ 49.8 km/h

Examii Insight

01 Time for the first part
- Time = distance ÷ speed.

02 Distance for the second part
- 30 minutes = 0.5 hours. Distance = speed × time.

03 Average speed
- Average speed = total distance ÷ total time.
- Do NOT average the two speeds.

49.8 km/h [4]

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25 **(a)** These are the first four terms of a sequence.

3 7 11 15

(i) Find the *n*th term.

Goes up in 4s

4n, then 4 – 3 = 1 too big: 4n – 1

Examii Insight

01 Goes up in 4s

- Difference 4 → 4n; first term 3 is 1 less than 4.

4n – 1 ..... [2]

(ii) Show that 603 is a term in the sequence.

Solve 4n – 1 = 603

4n – 1 + 1 = 603 + 1

4n = 604

n = 151

∴ n = 151 is a whole number, so 603 is a term

Examii Insight

01 Solve 4n – 1 = 603

- +1 on both sides, then ÷4 on both sides.
- A term must have a whole-number position.

[2]

(b) The *n*th term of a different sequence is $n^2 - 6$.

Find the first three terms of this sequence.

Substitute n = 1, 2, 3

$1^2 - 6 = -5$

$2^2 - 6 = -2$

$3^2 - 6 = 3$

∴ –5, –2, 3

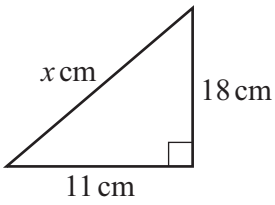
Examii Insight

01 Substitute n = 1, 2, 3

- Square n first, then subtract 6.

–5 , –2 , 3 [2]

26 The diagram shows a right-angled triangle.



NOT TO SCALE

Calculate the value of *x*.

Pythagoras' theorem

$x^2 = 11^2 + 18^2 = 445$, $x = \sqrt{445}$

∴ x = 21.1

Examii Insight

01 Pythagoras' theorem

- x is the hypotenuse (opposite the right angle).

$x =$ 21.1 ..... [2]

Question 27 and Question 28 are on the back page.

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27 Find the equation of the line parallel to $y = 4x + 3$ that passes through (2, 9).

Same gradient

$y = 4x + c$

$9 = 4(2) + c$

$c = 1$

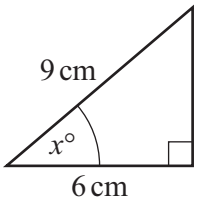
$\therefore\ y = 4x + 1$

Examii Insight

01 Same gradient
- Parallel lines have the same gradient: 4.
- Put the point (2, 9) in to find c: –8 on both sides.

$y =$ 4x + 1 [2]

28 The diagram shows a right-angled triangle.



NOT TO SCALE

Calculate the value of x.

SOHCAHTOA

$\cos x = \frac{6}{9}, \quad x = \cos^{-1}\left(\frac{6}{9}\right)$

$\therefore\ x = 48.2$

Examii Insight

01 SOHCAHTOA
- 6 = adjacent, 9 = hypotenuse → use cos.
- Calculator in DEGREES.

$x =$ 48.2 [2]

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