Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6501475003

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2018**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

This document consists of **20** printed pages.

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[Turn over

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

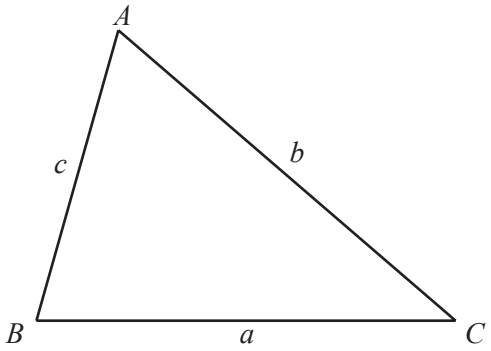
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 Gunter keeps chickens.
He records the number of eggs he collects each day for 31 days.
These are the results.

Number of eggs	10	11	12	13	14	15	16	17	18	19	20
Number of days	5	3	2	3	2	3	2	4	4	1	2

(a) Write down the range of the numbers of eggs.

..... [1]

(b) Find the inter-quartile range.

..... [2]

(c) Write down the mode.

..... [1]

(d) Find the median.

..... [1]

(e) Find the mean.

..... [2]

(f) Explain why the mode is not the best measure of average to represent these results.

..... [1]

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[Turn over

2 Flavia makes china cats.
They each cost $22.60 to make.

(a) Flavia sells some of them to Ari.
She makes a profit of 35% on each cat.

Calculate the price Ari pays for each cat.

$ ..... [2]

(b) Ari sells each cat for $43.

Calculate Ari's percentage profit.

.....% [3]

(c) Jean buys 92 of Flavia's cats.
This is 15% more than the number Ari bought.

Calculate the number of cats that Ari bought.

..... [3]

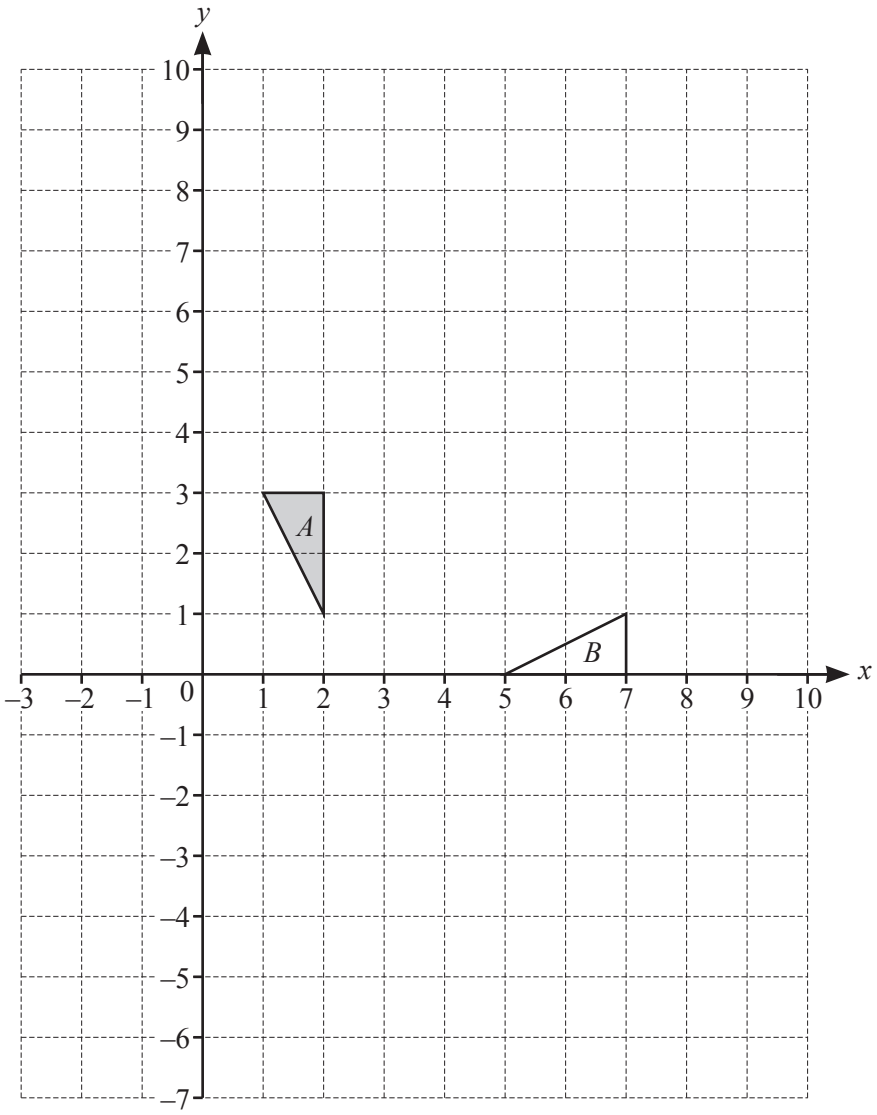
(d) Jean bought the cats for $32 each.
He sells some of the cats for $45 each.
For the rest of the cats he reduces the price by 5% each day.

Find the number of reductions he has made when the price first falls below $32.

..... [3]

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3



(a) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 3 \\ -7 \end{pmatrix}$. [2]

(b) Draw the image of triangle B after a stretch, factor 3 and the x-axis invariant. [2]

(c) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

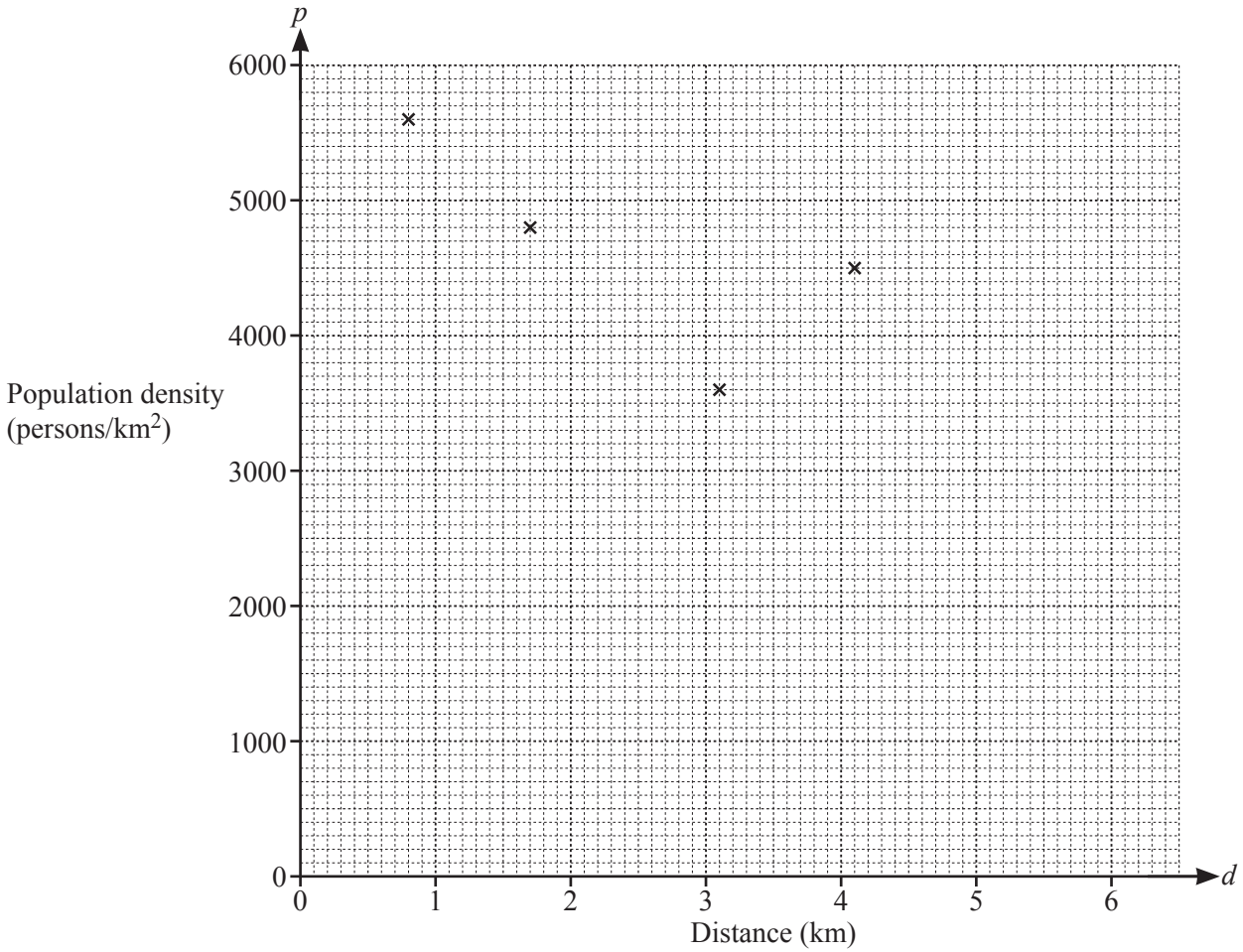
..... [3]

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4 Hamid records the population density, p persons/km^2, in ten regions of the city in which he lives.
He also records the distance, d km, of each region from the city centre.
The results are shown in the table.

Region	A	B	C	D	E	F	G	H	I	J
Distance (d km)	0.8	1.7	3.1	4.1	3.5	2.8	4.6	3.7	1.9	5.1
Population density (p persons/km^2)	5600	4800	3600	4500	2800	3300	1100	2300	3900	800

(a) Complete the scatter diagram.
The first four points have been plotted for you.



[3]

(b) **(i)** What type of correlation is shown in your scatter diagram?

..... [1]

(ii) Which region fits this model of correlation **least** well?

Region ..... [1]

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(c) **(i)** Calculate the equation of the regression line in the form $p = md + c$.

$p =$ ..... [2]

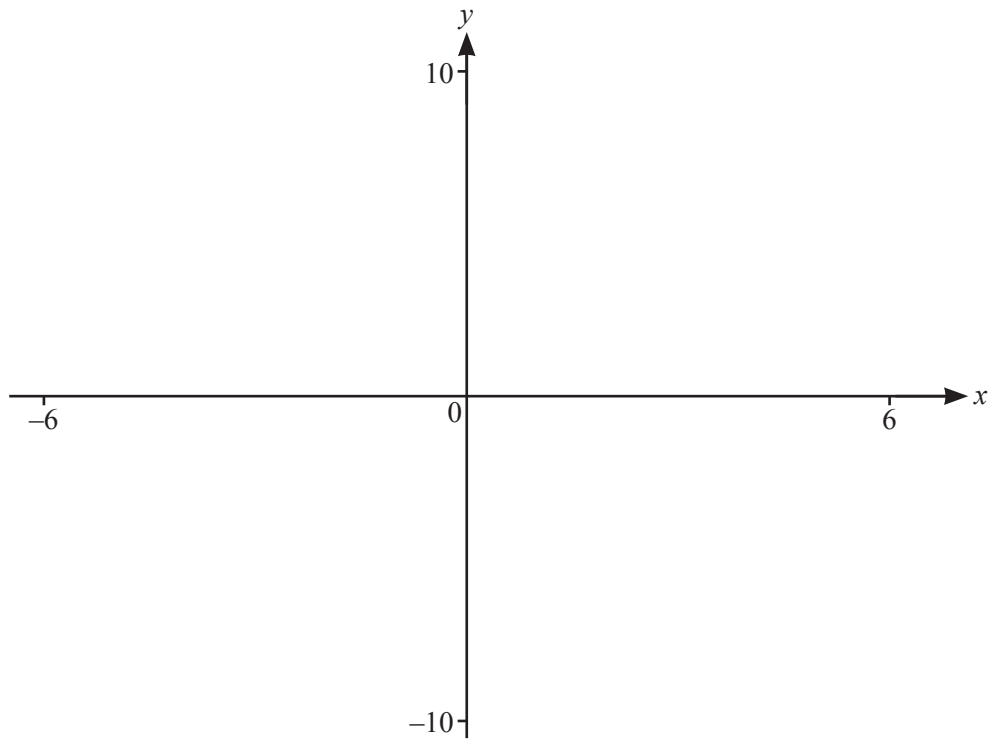
(ii) Use this equation to estimate the population density of a region 2.4 km from the city centre.

..... persons/km^2 [1]

(iii) Why would it not be sensible to use this equation to estimate the population density of a region 6.3 km from the city centre?

..... [1]

5



$$f(x) = \frac{(2x^2 - x + 5)}{(x^2 + x - 6)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -6 and 6. [3]

(b) Find the co-ordinates of the local maximum.

(..... , ...) [2]

(c) Find the equations of the three asymptotes to the graph of $y = f(x)$.

..... , ... , ... [3]

(d) The equation $f(x) = k$ has no solutions.

Find the range of values of k.

..... [2]

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(e) $g(x) = |x + 1|$

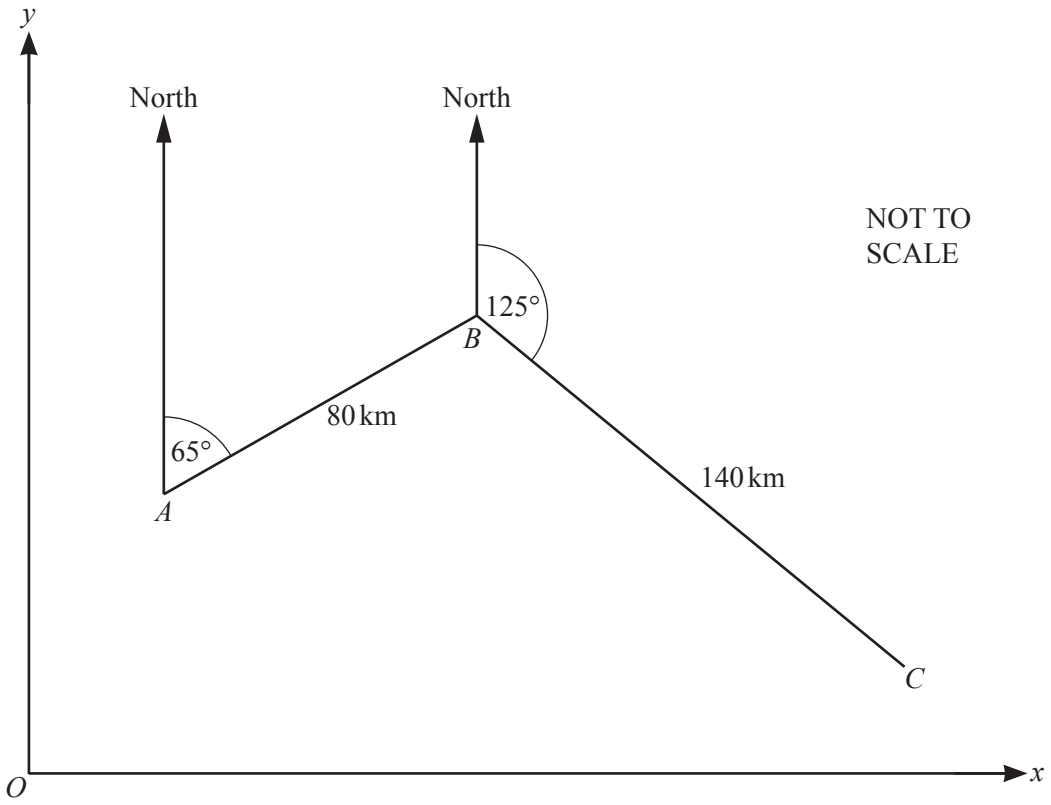
(i) Solve $f(x) = g(x)$.

$x =$ ..... or $x =$ ..... [2]

(ii) Solve the inequality $f(x) > g(x)$.

..... [2]

6



A ship sails 80 km on a bearing of 065° from A to B.
It then sails 140 km on a bearing of 125° from B to C.

(a) Find $\overrightarrow{AB}$ as a column vector with the components in kilometres.

[4]

(b) Find $\overrightarrow{AC}$ as a column vector with the components in kilometres.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [5]

(c) The ship sails directly back from C to A.

Using your answer to **part (b)**, calculate

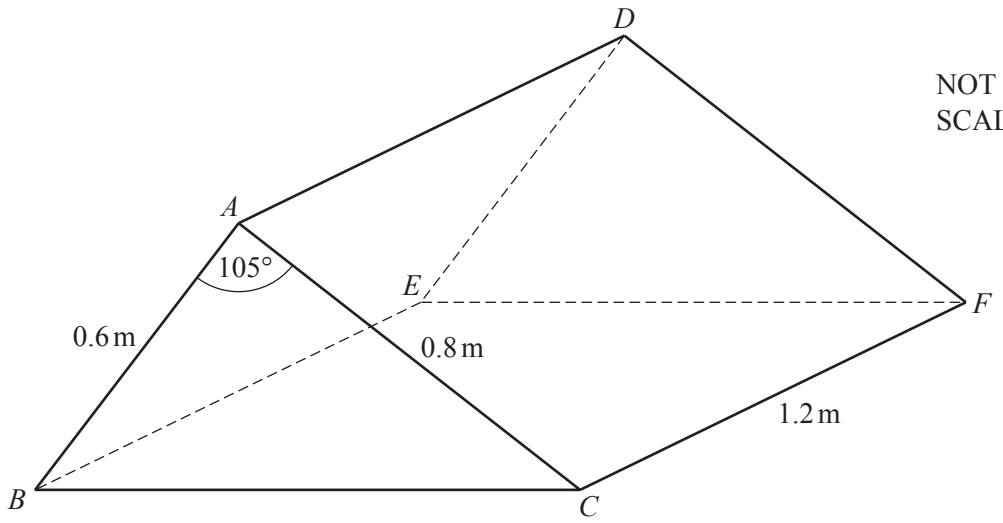
(i) the distance the ship sails from C to A,

..... km [2]

(ii) the bearing of A from C.

..... [3]

7



ABCDEF is a solid triangular prism.

(a) Calculate the volume of the prism.

.....m^3 [3]

(b) Calculate the total surface area of the prism.

.....m^2 [5]

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(c) *ABCDEF* is made of metal and has a mass of 2170 kg.
It is melted down and made into prisms similar to *ABCDEF*.
Each of these prisms has a mass of 2.17 kg.

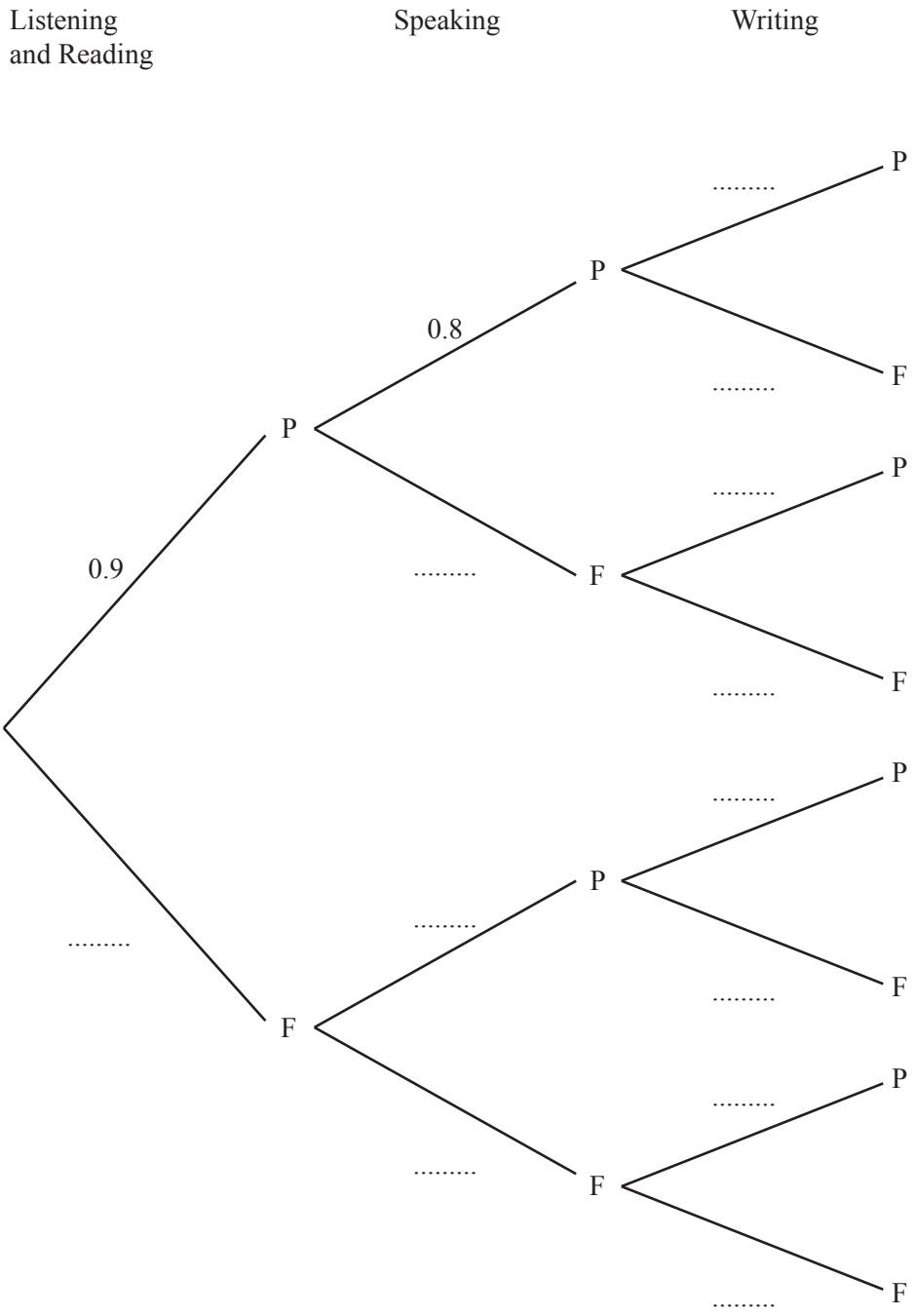
Calculate the total surface area of each of these smaller prisms.

.....m^2 [3]

8 Rashid takes a language examination that has three tests.

The probability that Rashid passes the Listening and Reading test is 0.9 .
The probability that Rashid passes the Speaking test is 0.8 .
The probability that Rashid passes the Writing test is 0.7 .

(a) Complete the tree diagram to show the probabilities of passing (P) and failing (F) each part.



[3]

(b) To pass the whole examination Rashid has to pass all three tests.

Calculate the probability that he passes the whole examination.

..... [2]

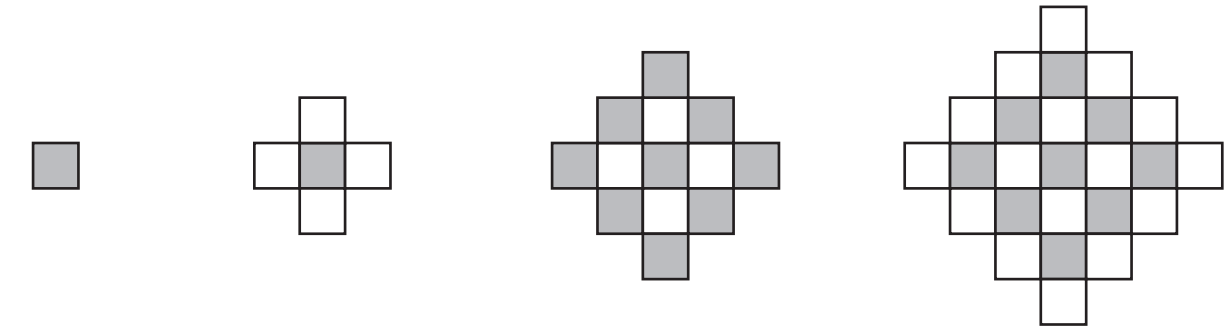
(c) If Rashid only fails one test, he can take that test again.

Calculate the probability that Rashid needs to take one test again.

..... [4]

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9



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Complete the table for the sequence of patterns above.

Pattern number	1	2	3	4	5	6
Number of grey tiles	1	1	9	9		
Number of white tiles	0	4	4	16		
Total number of tiles	1	5	13			

[3]

(b) Find the number of each colour of tiles in

(i) Pattern 15,

Grey .....

White ..... [2]

(ii) Pattern 20.

Grey .....

White ..... [2]

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(c) Find an expression, in terms of n, for the total number of tiles in Pattern n.

..... [2]

10 Isabel drives from Geneva to Rome, a distance of 930 km.
Her average speed is x km/h.

(a) Write down an expression, in terms of x, for the time, in hours, the journey takes.

..... h [1]

(b) She returns from Rome to Geneva along the same route at an average speed of $(x + 5)$ km/h.

The journey takes $\frac{1}{2}$ hour less than the journey from Geneva to Rome.

(i) Write down an equation, in terms of x, and show that it simplifies to

$$x^2 + 5x - 9300 = 0.$$

[3]

(ii) Solve this equation.
Give your answers correct to 1 decimal place.

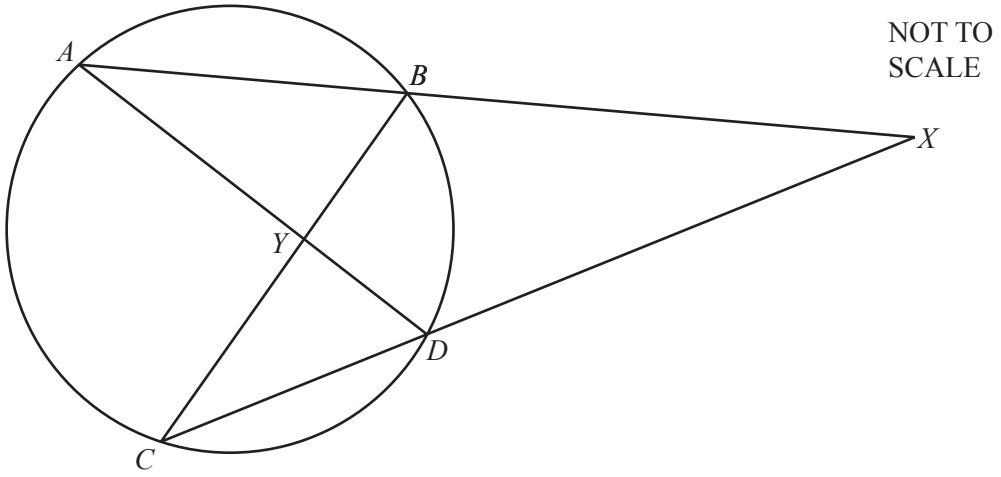
$x =$ ..... or $x =$ ..... [3]

(iii) Find the time taken for the journey from Rome to Geneva in hours and minutes.

..... h ..... min [2]

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11



A, B, C and D are points on the circle.
ABX, CDX, AYD and BYC are straight lines.

(a) (i) Explain why triangle ADX is similar to triangle CBX.

.....

.....

..... [2]

(ii) Use **part (a)(i)** to show that $XA \times XB = XC \times XD$

[1]

(b) $XB = 6\,\text{cm}$, $DC = 5\,\text{cm}$ and $XD = 7\,\text{cm}$.

Calculate the length AB.

..... cm [2]

(c) Find the value of these fractions.

(i) $\dfrac{\text{Area of triangle } ADX}{\text{Area of triangle } CBX}$

..... [1]

(ii) $\dfrac{\text{Area of triangle } AYB}{\text{Area of triangle } CYD}$

..... [1]

Question 12 is printed on the next page.

12 $f(x) = 2x + 1$ $g(x) = 4 - 3x$ $h(x) = 2^x - 1$

(a) Find $h(-2)$.

..... [1]

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

$g^{-1}(x) =$ ..... [2]

(c) Find $g(f(3))$.

..... [2]

(d) Find and simplify $g(g(x))$.

..... [2]

(e) Find $h^{-1}(7)$.

..... [2]

(f) Write as a single fraction in its simplest form.

$$\frac{1}{f(x)} + \frac{1}{g(x)}$$

..... [3]

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