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CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/04

Paper 4 (Extended)

For examination from 2020

SPECIMEN PAPER

2 hours 15 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 or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- 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 your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [].

This document has **18** pages. Blank pages are indicated.

Formula List

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

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 . $A = \pi rl$

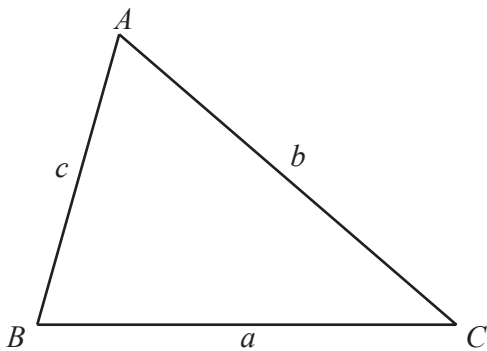
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

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



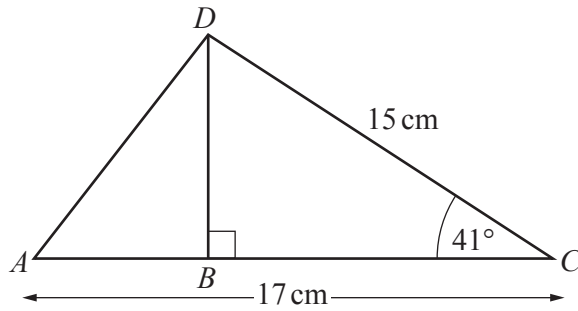
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



NOT TO
SCALE

(a) Calculate the length of BD .

..... cm [2]

(b) Calculate the area of triangle ACD .

..... cm^2 [2]

(c) Use the cosine rule to find the length of AD .

..... cm [3]

- 2 (a) Jay buys a bicycle for \$220.
He later sells it for \$160.

Calculate his percentage loss.

.....% [3]

- (b) A television has a sale price of \$216 after a reduction of 10%.

Calculate the original price of the television.

\$ [3]

- (c) The population of a village is 2180.
The population decreases by 3% each year.

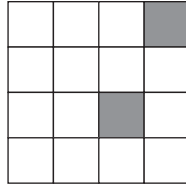
- (i) Calculate the population in 20 years' time.

..... [3]

- (ii) Calculate the number of whole years it takes for the population to decrease from 2180 to less than 1000.

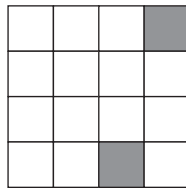
..... [2]

- 3 (a) (i) Shade in **one** more square so that the diagram has one line of symmetry.



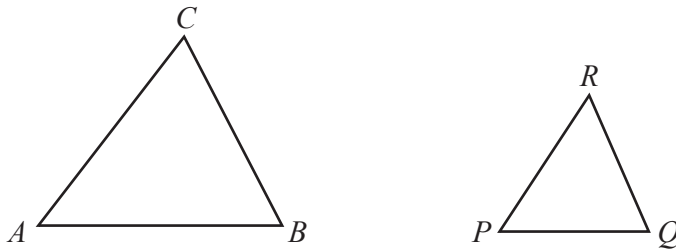
[1]

- (ii) Shade in **two** more squares so that the diagram has rotational symmetry of order 2 and no lines of symmetry.



[1]

(b)



NOT TO SCALE

Triangle ABC and triangle PQR are mathematically similar.
 $AB : PQ = 3 : 2$.

- (i) $CB = 10.5$ cm.

Calculate the length of RQ .

..... cm [2]

- (ii) The area of triangle ABC is 45 cm^2 .

Calculate the area of triangle PQR .

..... cm^2 [2]

- 4 (a) The speeds, v km/h, of 120 cars passing under a bridge are measured.
The table shows the results.

Speed (v km/h)	$30 < v \leq 50$	$50 < v \leq 60$	$60 < v \leq 70$	$70 < v \leq 75$	$75 < v \leq 90$
Frequency	2	25	46	41	6

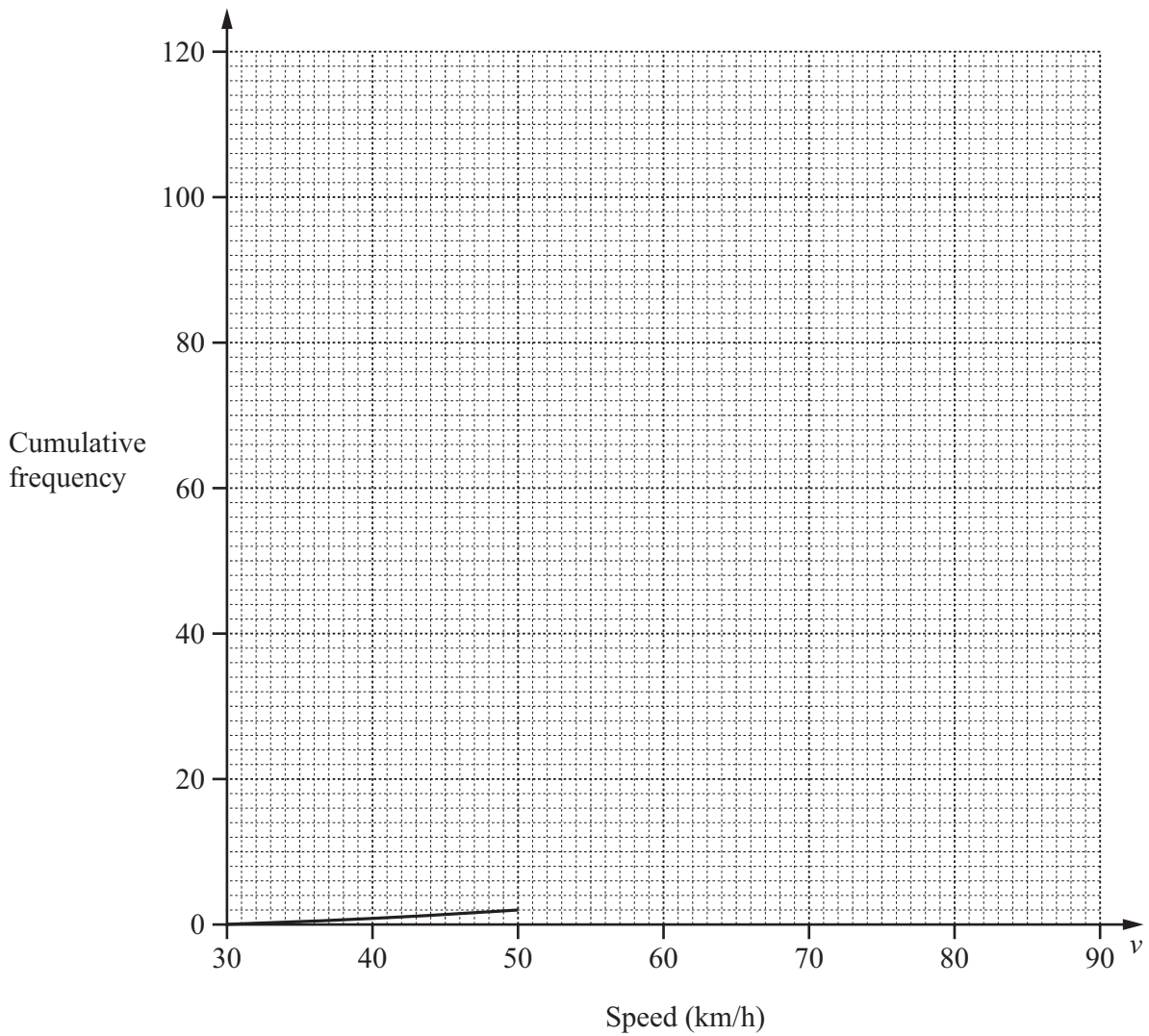
- (i) Write down the interval that contains the lower quartile.

..... [1]

- (ii) Calculate an estimate of the mean.

..... km/h [2]

- (iii) Complete the cumulative frequency diagram for these 120 cars.



[3]

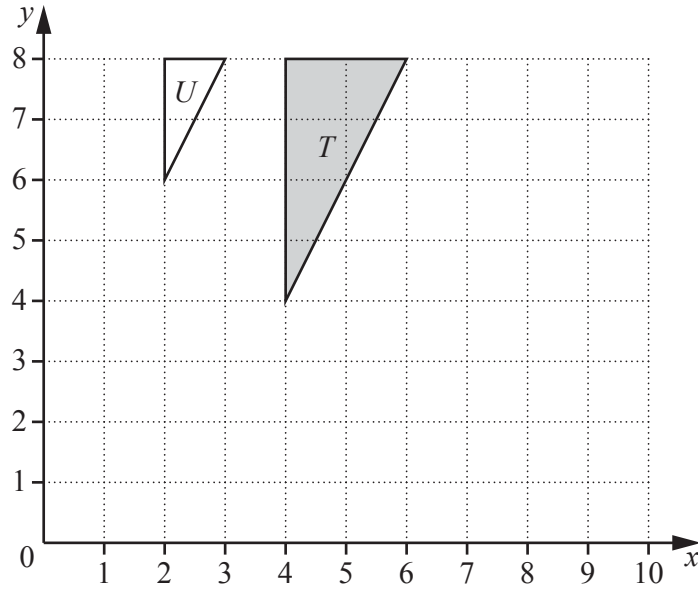
(b) The table below shows the monthly rainfall and the average midday temperatures of a city.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (r mm)	15	20	20	35	70	90	75	70	50	30	12	8
Temperature (t °C)	35	25	22	15	10	10	15	20	27	30	38	36

Find the equation of the line of regression, giving t in terms of r .

$t = \dots\dots\dots$ [2]

5



(a) (i) Describe fully the **single** transformation that maps triangle T onto triangle U .

.....
 [3]

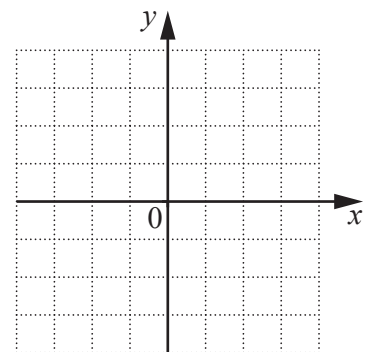
(ii) Describe fully the inverse of the transformation in **part (a)(i)**.

.....
 [2]

(b) (i) Draw the image of triangle T under a reflection in the line $y = x$. [2]

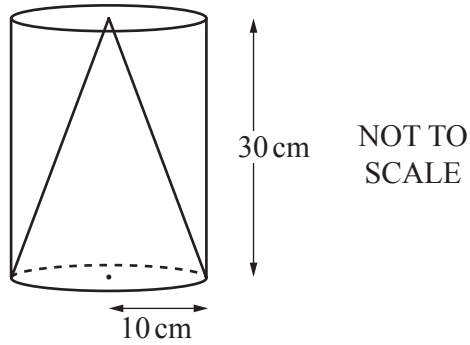
(ii) Draw the image of triangle T under a rotation of 90° anti-clockwise about the point $(6, 8)$. [2]

(c) Describe fully the **single** transformation equivalent to a rotation 90° clockwise about $(0, 0)$ followed by a reflection in the line $y = -x$.
 You may use the grid to help you.



.....
 [3]

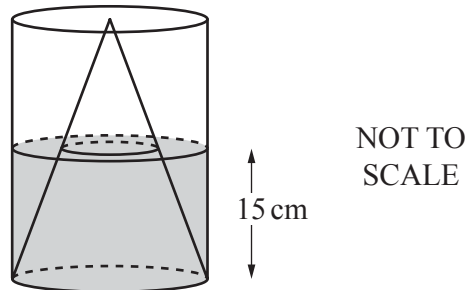
- 6 The diagram shows a solid cone inside a cylinder.
 The base radius of the cone and the radius of the cylinder are both 10 cm.
 The height of both the cone and the cylinder is 30 cm.



- (a) Find the volume of the cylinder **not** occupied by the cone.

..... cm³ [3]

- (b) Water is poured into the cylinder until it reaches a depth of 15 cm.



- (i) Calculate the volume of the part of the cone that is below the water level and show that it rounds to 2749 cm³, correct to the nearest cubic centimetre.

[4]

- (ii) Calculate the amount of water that has been poured into the cylinder.
 Give your answer in litres.

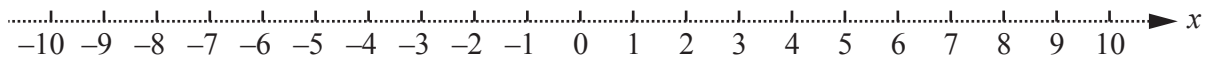
..... litres [3]

7 (a) (i) Solve the inequality.

$$2(x - 3) < 5(x + 3)$$

..... [3]

(ii) Show your answer to **part (a)(i)** on the number line.



[1]

(b) Solve the equation.

$$(x + 3)^2 + (x + 1)^2 = 25$$

Give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [6]

(c) Solve the equations.

(i) $\log x = 5 - x$

$x = \dots\dots\dots$ [3]

(ii) $\log x = |5 - x|$

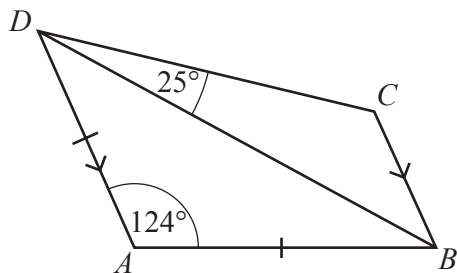
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(d) Simplify, giving your answer as a single fraction.

$$\frac{x}{x-1} - \frac{2}{x+1}$$

$\dots\dots\dots$ [3]

8 (a)



NOT TO SCALE

In the quadrilateral $ABCD$, $DA = AB$ and DA is parallel to CB .
 Angle $DAB = 124^\circ$ and angle $BDC = 25^\circ$.

Calculate angle BCD .

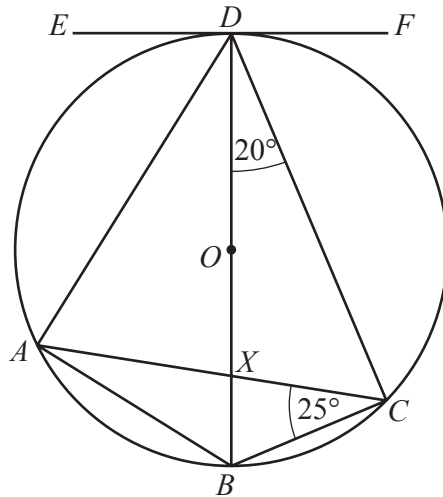
Angle $BCD = \dots\dots\dots$ [3]

(b) Nine of the angles of a 10-sided polygon are each 142° .

Calculate the other angle.

$\dots\dots\dots$ [3]

(c)



NOT TO SCALE

A, B, C and D lie on the circle, centre O .
 BD is a diameter and EDF is a tangent at D .
 AC and BD intersect at X .

Angle $BCA = 25^\circ$ and angle $BDC = 20^\circ$.

Calculate

(i) angle ADE ,

Angle $ADE = \dots\dots\dots$ [2]

(ii) angle DAC ,

Angle $DAC = \dots\dots\dots$ [2]

(iii) angle AXD .

Angle $AXD = \dots\dots\dots$ [1]

- 9 (a) Kim walks 10 km at 4 km/h and then a further 6 km at 3 km/h.

Calculate Kim's average speed.

..... km/h [3]

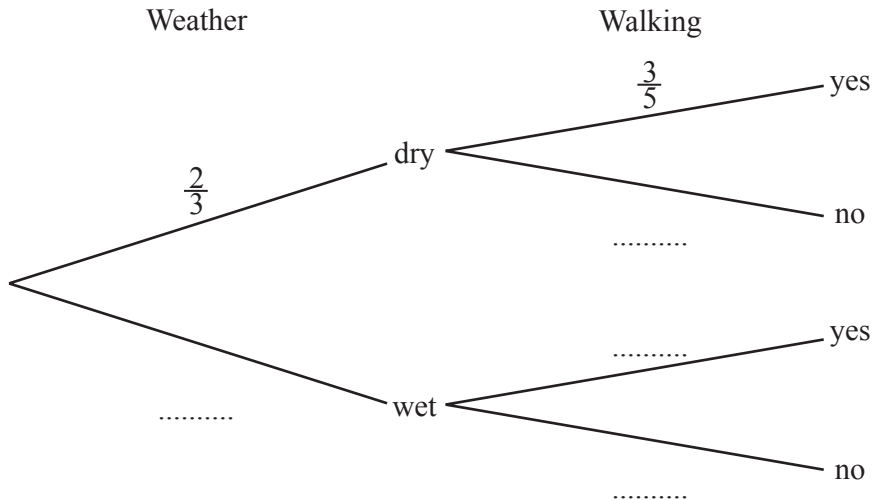
- (b) Chung runs at x km/h for 45 minutes and then at $(x - 2)$ km/h for 30 minutes.

Find an expression, in terms of x , for Chung's average speed in km/h.
Give your answer in its simplest form.

..... km/h [4]

- 10 In this question, the weather is only considered to be either wet or dry.
 When the weather is dry the probability that Sara will go walking is $\frac{3}{5}$.
 When the weather is wet the probability that Sara will go walking is $\frac{1}{10}$.
 The probability of a dry day is $\frac{2}{3}$.

(a) Complete the tree diagram.



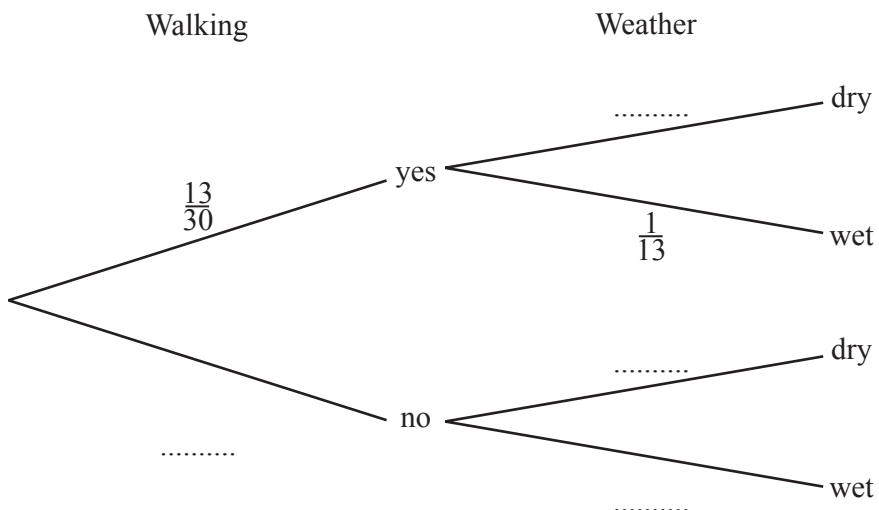
[3]

(b) Show that the probability that Sara goes walking is $\frac{13}{30}$.

[2]

(c) The probability that Sara does not go walking when the weather is wet is $\frac{9}{30}$.

Complete this tree diagram.



[3]

11 $f(x) = x^2 - 16$ $g(x) = \frac{2}{x+1}, x \neq -1$ $h(x) = 2^x$

(a) Find $h(3)$.

..... [1]

(b) Find the range of $g(x)$ for the domain $\{0, 1\}$.

..... [1]

(c) $f(x - 2)$ can be written as $(x + a)(x + b)$.

Find the value of a and the value of b .

$a =$

$b =$ [4]

(d) Find the inverse of

(i) $g(x)$,

..... [3]

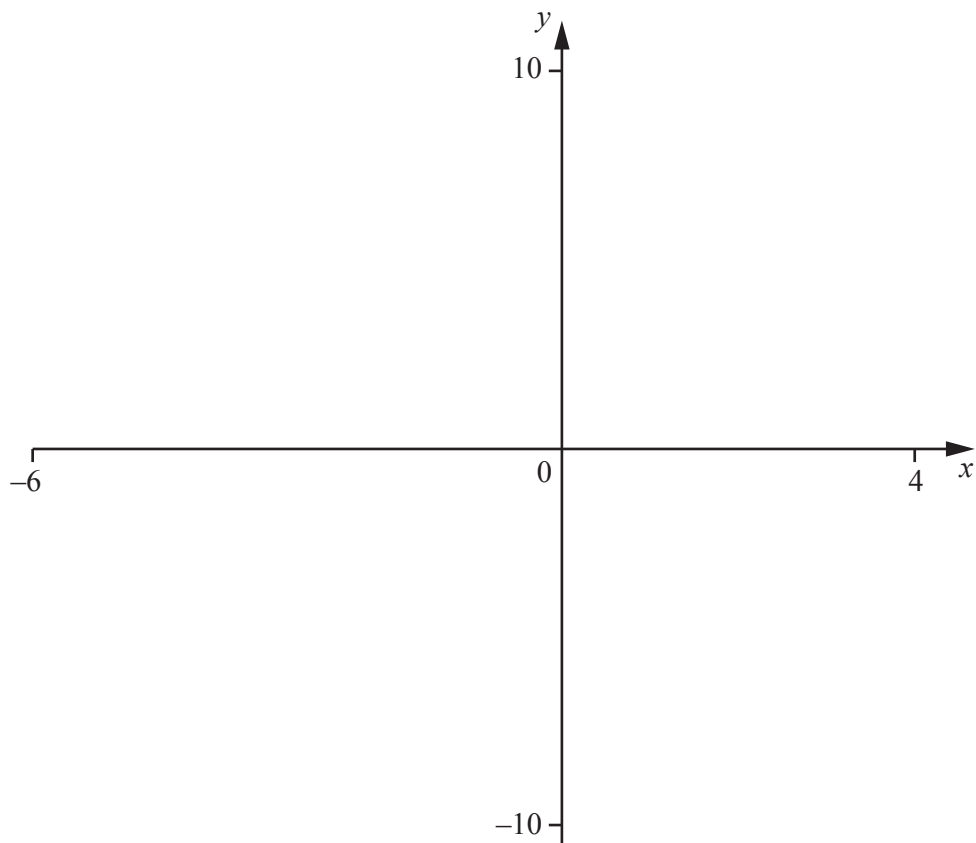
(ii) $h(x)$.

..... [2]

(e) Describe fully the **single** transformation that maps the graph of $y = f(x)$ onto the graph of $y = 2x^2 - 32$.

.....

..... [2]



(a) On the diagram, sketch the graphs of $y = \frac{12}{x+2}$ and $y = 2^x - 5$ for values of x between $x = -6$ and $x = 4$. [4]

(b) Write down the equation of each asymptote of the graph of

(i) $y = \frac{12}{x+2}$,

.....
 [2]

(ii) $y = 2^x - 5$.

..... [1]

(c) Solve the inequality.

$$2^x - 5 > \frac{12}{x+2} \text{ for } x > 0.$$

..... [2]

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