Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

* 9 3 3 7 4 7 0 1 8 2 *

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

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.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **18** printed pages and **2** blank pages.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Evaluate $\dfrac{3.5 - 1.9}{0.8}$.

Answer ..... [1]

(b) Evaluate $9 + 6 \div 3 - 4$.

Answer ..... [1]

2 **(a)** Work out 15% of 80.

Answer ..... [1]

(b) Work out $\dfrac{3}{5} - \dfrac{2}{7}$.

Give your answer as a fraction in its simplest form.

Answer ..... [1]

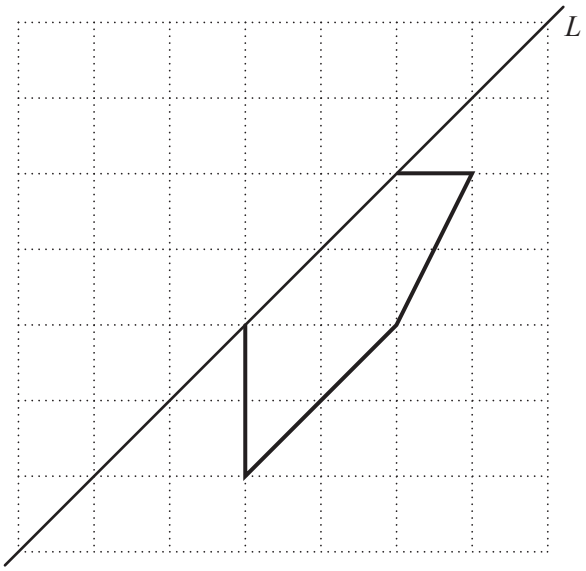
3 Write these numbers in order of size, starting with the smallest.

$\dfrac{1}{3}$ 0.32 $\dfrac{15}{40}$ 0.3 $\dfrac{9}{31}$

Answer ..... , ... , ... , ... , ... [2]
smallest

4 **(a)** The diagram shows part of a shape which is symmetrical about the line L.

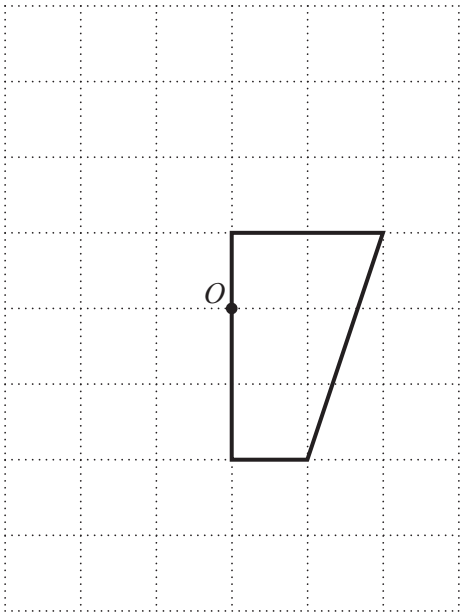
Complete the shape.



[1]

(b) The diagram shows part of a shape which has rotational symmetry of order 2 about the point O.

Complete the shape.



[1]

5 A plane leaves London on a flight to Dubai.

(a) The plane lands in Dubai where the local time is 17 20.
The flight time is 6 hours 50 minutes.
The local time in Dubai is 3 hours ahead of the local time in London.

Calculate the local time in London when the flight left.

Answer ..... [2]

(b) At one time during the flight the temperature inside the plane is 17 °C.
The temperature outside the plane is −43 °C.

Work out the difference between the inside and outside temperatures.

Answer ..... °C [1]

(c) The plane leaves London where the temperature outside is 17 °C.
The plane rises to a height where the temperature outside is −43 °C.
The temperature decreases by 2 °C with every increase of 300 m in height.

Calculate the increase in height of the plane.

Answer ..... m [1]

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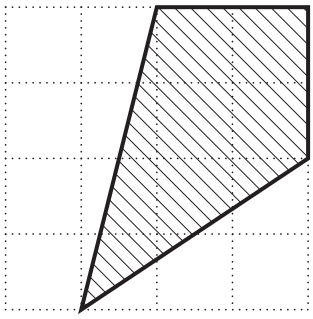
6 **(a)** What fraction of this 4 × 4 square is shaded?



Answer ..... [1]

(b) A youth club has 150 members.
60 of the members are girls.

What percentage of the club members are girls?

Answer ..... % [1]

(c) Ben is given some money.
He spends some of it and saves the remainder.
The ratio of the money he spends to the money he saves is 3 : 1.
He spends $15.

Calculate the amount of money Ben was given.

Answer $ ..... [1]

7 Usama recorded the number of items bought by each of 20 customers at a shop.
The results are shown in the table.

Number of items bought	1	2	3	4	5	6
Number of customers	3	0	5	3	7	2

(a) Write down the mode.

Answer ..... [1]

(b) Find the median number of items bought.

Answer ..... [1]

(c) Calculate the mean number of items bought.

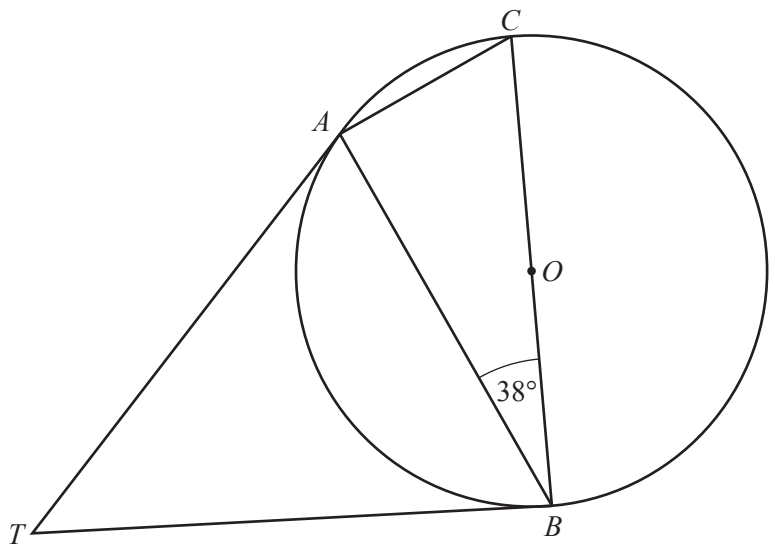
Answer ..... [2]

(d) Usama draws a pie chart to show the data.

Calculate the angle of the sector on the pie chart which represents the number of people who bought 3 items.

Answer ..... [1]

8



A, B and C are points on the circumference of a circle centre O.
O is the midpoint of BC and $A\hat{B}C = 38°$.
Tangents are drawn from T to touch the circle at A and B.

(a) Calculate $B\hat{C}A$.

Answer $B\hat{C}A =$ ..... [1]

(b) Calculate $A\hat{T}B$.

Answer $A\hat{T}B =$ ..... [2]

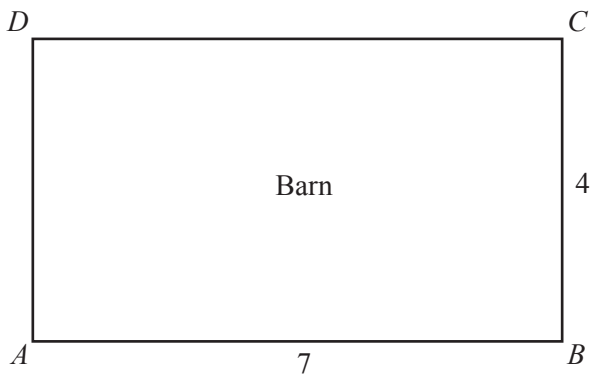
9 Find the integers that satisfy $1 < 3x + 5 \leqslant 11$.

Answer ..... [2]

10 The scale diagram below shows a barn $ABCD$.
$AB = 7$ m and $BC = 4$ m.
On the diagram 1 cm represents 1 m.

A horizontal rail is attached to the outside wall of the barn from A to B.
Jasper is a dog attached to a rope 3 m long.
The other end of the rope is attached to the rail and can slide along it.

On the diagram, shade the region where Jasper can go. [3]



Scale: 1 cm to 1 m.

11

$$\begin{pmatrix} 2 & a \\ -3 & 1 \end{pmatrix}\begin{pmatrix} -4 & b \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} 7 & 10 \\ 15 & 2 \end{pmatrix}$$

Find a and b.

Answer $a =$ .....

$b =$ ..... [2]

12 Basia records the colour of 100 cars passing the school gate.
Her results are recorded in the table.

Colour of car	Black	Grey	Red	Blue	Other
Frequency	43	18	12	9	18

(a) Use Basia's results to estimate the probability that the next car seen is a **blue** car.

Answer ..... [1]

(b) In the next hour, 500 cars pass the school gate.

Use Basia's results to estimate the number of these cars that are **red**.

Answer ..... [1]

(c) Colin records the colour of the next 100 cars passing the school gate.
His results are shown in the table below.

Colour of car	Black	Grey	Red	Blue	Other
Frequency	34	10	18	28	10

Use Basia's and Colin's combined results to estimate the number of **red** cars that would be seen when 500 cars pass the school gate.

Answer ..... [1]

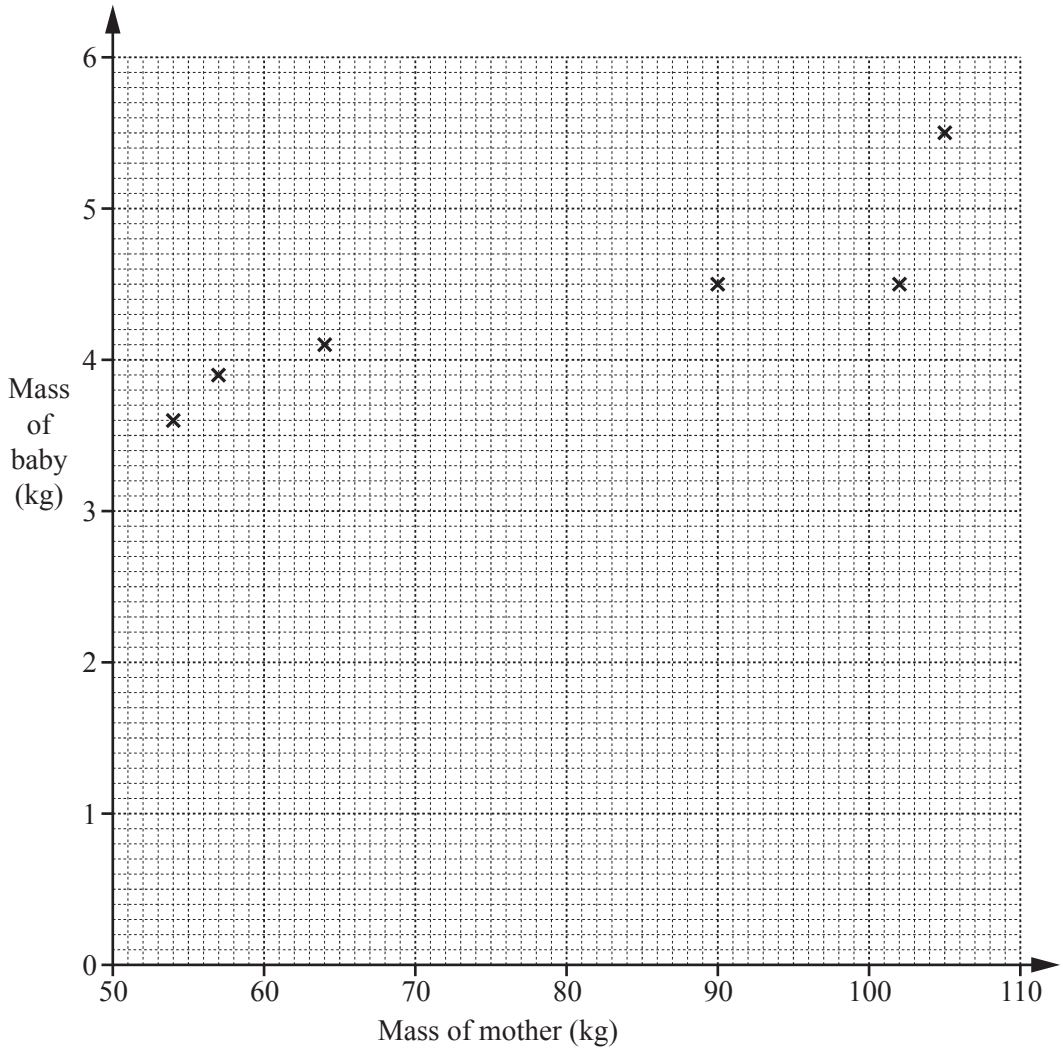
(d) Which of the estimates in **part (b)** or in **part (c)** is likely to be the best?
Give a reason for your decision.

The best estimate is ..... because .....

..... [1]

13 The table below shows the masses of 10 mothers and their babies at birth.

Mass of mother (kg)	64	90	54	102	57	105	70	89	57	75
Mass of baby (kg)	4.1	4.5	3.6	4.5	3.9	5.5	3.9	4.3	3.2	4.4



(a) On the grid, complete the scatter diagram.
The first six points have been plotted for you. [1]

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

Answer ..... [1]

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

(d) Anna has a mass of 82 kg and gives birth to a baby.

Use your line of best fit to estimate the mass of her baby.

Answer ..... kg [1]

14 Factorise completely

(a) $2ax - 3by + 6bx - ay$,

Answer ..... [2]

(b) $27x^2 - 3y^2$.

Answer ..... [2]

15 $\mathrm{f}(x) = 3 - 2x$ $\mathrm{g}(x) = 4x^3 - 1$

(a) Find $\mathrm{f}(5)$.

Answer ..... [1]

(b) Find $\mathrm{g}(-2)$.

Answer ..... [1]

(c) Find and simplify $\mathrm{f}(4x^3 - 1)$.

Answer ..... [1]

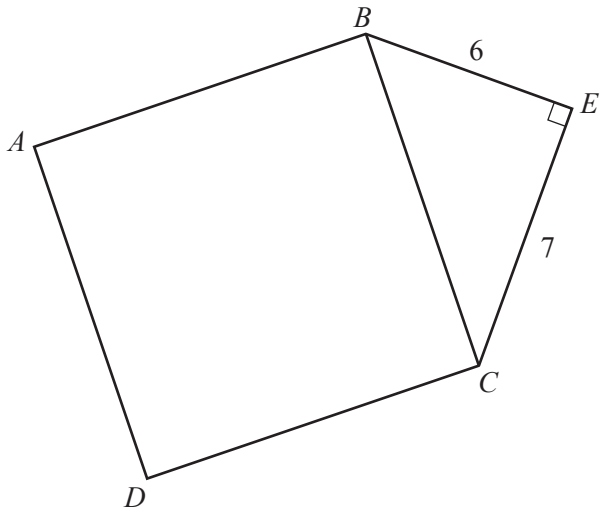
16 **(a)** Evaluate $3^3 - 3^0$.

Answer ..... [1]

(b) Simplify completely $\left(\dfrac{9a^3b^3}{16ba^5}\right)^{\frac{1}{2}}$.

Answer ..... [2]

17

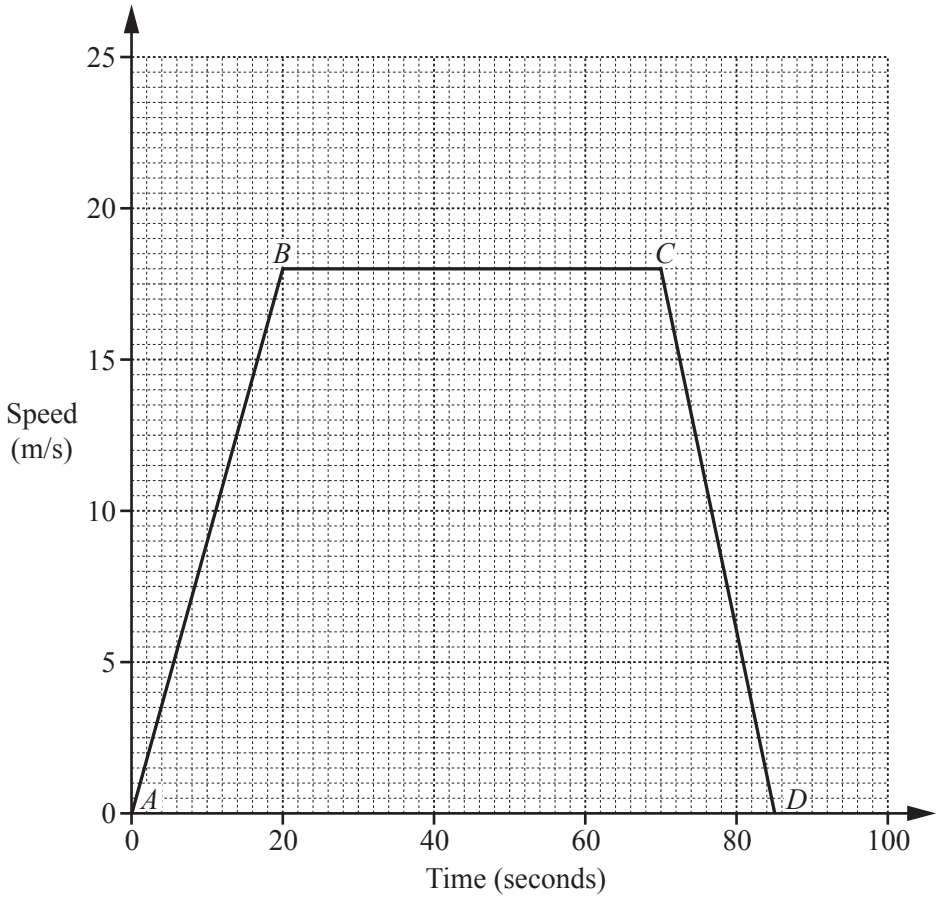


The diagram shows a square *ABCD* joined to a right-angled triangle *BEC*.
$BE = 6$ cm and $EC = 7$ cm.

Calculate the area of the pentagon, *ABECD*.

Answer ..... cm^2 [3]

18



The speed-time graph shows the motion of a car.

(a) Describe **fully** the motion of the car represented by each of the lines *AB*, *BC* and *CD* on the graph.

AB has been done for you.

AB Accelerates for the first 20 s at 0.9 m/s^2.

BC .....

CD ..... [3]

(b) Find the total distance travelled by the car during this motion.

Answer ..... m [2]

19 **(a)** One day in 2016 the population of Nepal was 28 795 701.

Write this number correct to three significant figures.

Answer ..... [1]

(b) The table below shows the approximate population of some countries in 2016 and their land areas.

Country	Population	Land area in km^2
Brazil	2.1×10^8	8.5×10^6
Greenland	5.6×10^4	2.2×10^6
Hong Kong	7.4×10^6	1.1×10^3
India		3.3×10^6
Nigeria	1.9×10^8	9.2×10^5

(i) The population of India was approximately 130 000 000.

In the table above complete the row for India.
Write the number in standard form. [1]

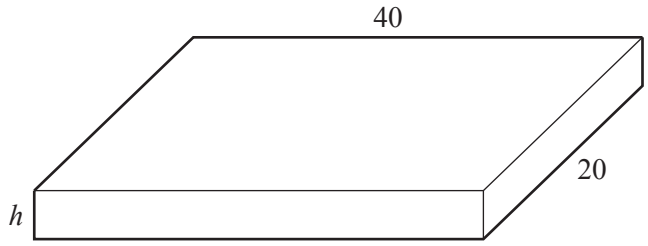
(ii) Calculate the **total** land area of India and Nigeria.
Give your answer in standard form.

Answer ..... km^2 [2]

(iii) Which country in the table has the smallest population per km^2?

Answer ..... [1]

20



A paving slab is a cuboid with length 40 cm, width 20 cm and depth h cm.
Its volume is 2400 cm^3.

(a) Find the value of h.

Answer $h =$ ..... [1]

(b) Calculate the volume of concrete needed to make 1000 of these slabs.
Give your answer in m^3.

Answer ..... m^3 [1]

(c) A mathematically similar slab has length 60 cm.

Calculate the volume of concrete, in cm^3, needed to make **one** of these larger slabs.

Answer ..... cm^3 [2]

21 $\mathbf{p} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$

(a) Write $3\mathbf{p} - \mathbf{q}$ as a column vector.

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) R is the point $(11, -2)$ and O is the point $(0, 0)$.
The vector $\overrightarrow{OR}$ can be written in the form $\mathbf{p} + n\mathbf{q}$, where n is an integer.

Find the value of n.

Answer $n =$ ..... [2]

22 $s = \sqrt[3]{t + 4}$

(a) Find s when $t = 121$.

Answer $s =$ ..... [1]

(b) Rearrange the formula to make t the subject.

Answer $t =$ ..... [2]

23

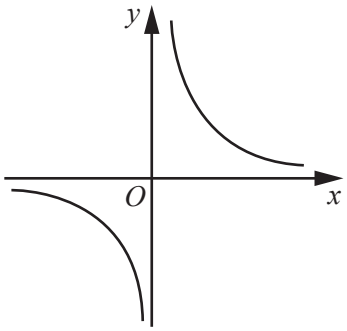


Figure A

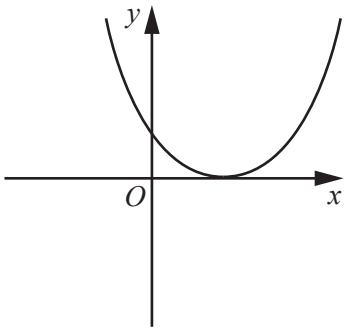


Figure B

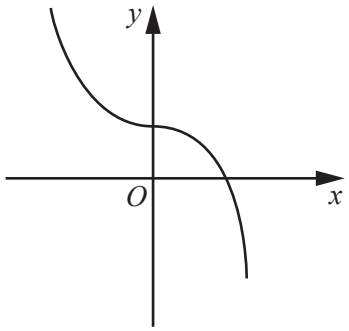


Figure C

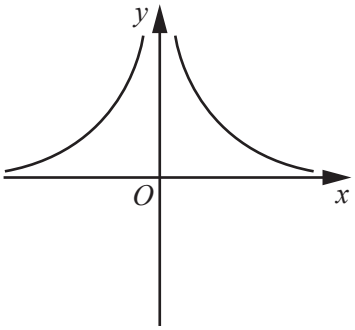


Figure D

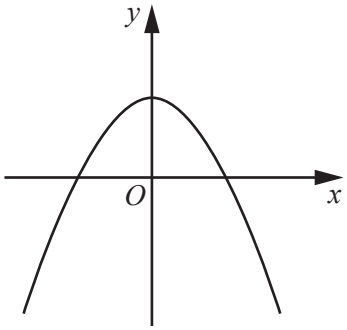


Figure E

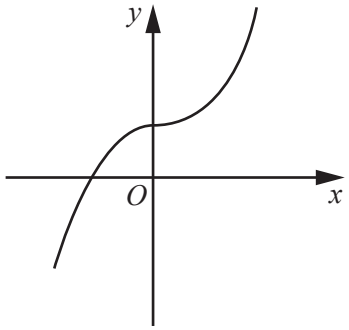


Figure F

State which of the figures above could be the graph of

(a) $y = x^3 + 2$,

Answer ..... [1]

(b) $y = \frac{2}{x}$,

Answer ..... [1]

(c) $y = 2 - x^2$.

Answer ..... [1]

24 **(a)** Show that $\frac{12}{x+2} + \frac{10}{x-1} = \frac{7}{2}$ can be simplified to give the equation $7x^2 - 37x - 30 = 0$.

[3]

(b) Solve, by factorisation, $7x^2 - 37x - 30 = 0$.

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

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