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CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42

Paper 4 (Extended)

May/June 2020

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 **20** 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 . $A = \pi rl$

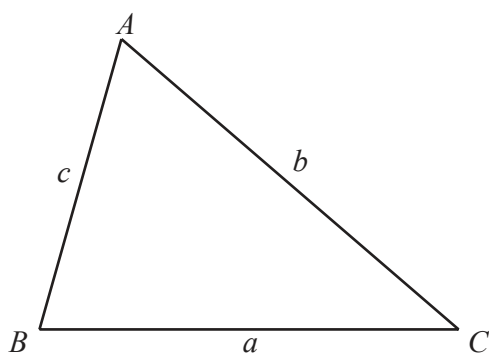
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

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



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

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

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

3Answer **all** the questions.

- 1** A class of 40 students complete a science test.
The table shows the marks of the 40 students.

Mark	0	1	2	3	4	5	6	7	8	9	10
Number of students	1	1	2	5	5	5	6	3	9	2	1

- (a) Write down the mode.

..... [1]

- (b) Work out the range.

..... [1]

- (c) Find the median.

..... [1]

- (d) Find the interquartile range.

..... [2]

- (e) Calculate the mean.

..... [2]

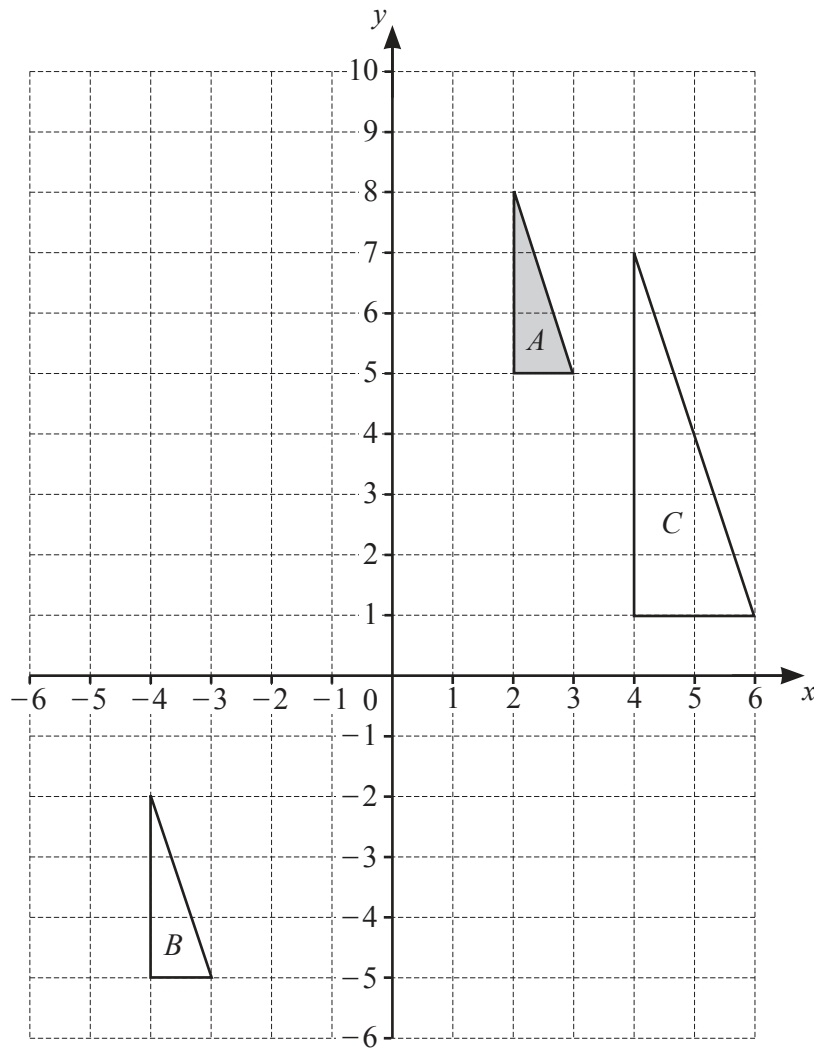
- (f) Two of the students are chosen at random.

Find the probability that the difference in their marks is 8.

..... [3]

4

2 (a)



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

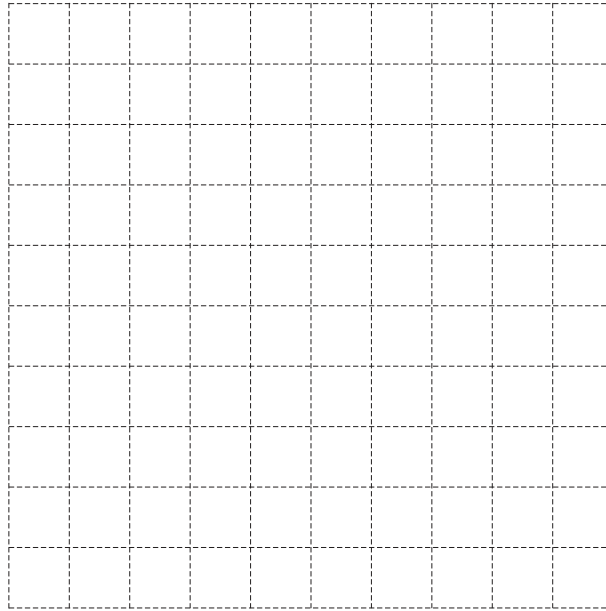
.....
 [2]

- (ii) Describe fully the **single** transformation that maps triangle A onto triangle C .

.....
 [3]

5

(b) You may use the grid to help you in answering this question.



The transformation P is a rotation of 90° clockwise about the origin.
The transformation Q is a reflection in the line $y = -x$.

(i) Find the image of the point $(5, -2)$ under the transformation P.

(.....,) [1]

(ii) Find the image of the point $(5, -2)$ under the transformation Q.

(.....,) [1]

(iii) Describe fully the **single** transformation equivalent to P followed by Q.

.....
..... [2]

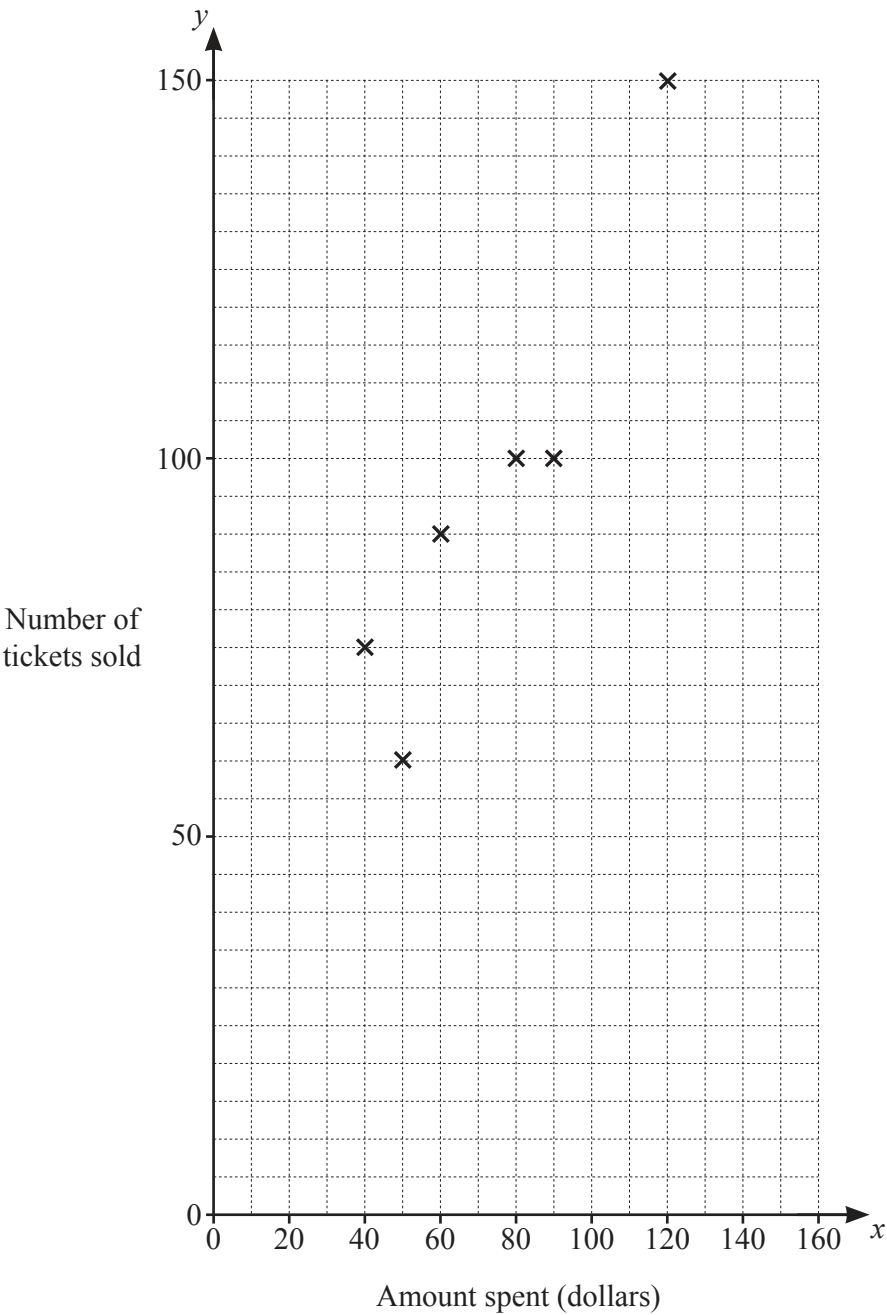
(iv) Describe fully the **single** transformation equivalent to Q followed by P.

.....
..... [2]

- 3 Petra is a singer.
She wants to estimate how much to spend on advertising.
The table shows the amount spent on advertising, \$ x , and the number of tickets sold, y , for 10 performances.

Amount spent (\$ x)	80	60	50	120	90	40	100	110	70	150
Number of tickets sold (y)	100	90	60	150	100	75	120	120	100	150

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



[2]

- (ii) What type of correlation is shown by the scatter diagram?

..... [1]

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(b) Find the mean amount of money spent on advertising.

\$ [1]

(c) (i) Find the equation of the regression line for y in terms of x .

$y =$ [2]

(ii) Use your regression line to estimate the number of tickets sold when Petra spends \$130 on advertising.

..... [1]

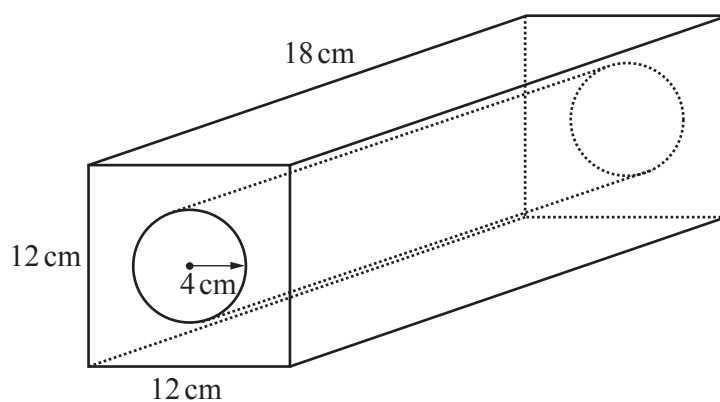
(iii) Explain why Petra should not rely on this regression line to estimate the number of tickets she will sell if she spends \$500 on advertising.

.....

..... [1]

8

- 4 A piece of metal is in the shape of a cuboid.
The cuboid has length 18 cm, width 12 cm and height 12 cm.
A cylinder is removed from the cuboid.
The cylinder has length 18 cm and radius 4 cm.

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- (a) (i) Find the volume of the metal remaining after the cylinder has been removed.

..... cm^3 [3]

- (ii) Write your answer to **part (i)** in standard form.

..... cm^3 [1]

9

- (b) Find the total surface area of the metal remaining after the cylinder has been removed.

..... cm^2 [4]

- (c) The **cylinder removed** is melted and formed into 16 identical spheres.

- (i) Calculate the volume of **one** sphere.

..... cm^3 [1]

- (ii) Calculate the radius of one sphere.

..... cm [2]

10

- 5 Fifty students, 25 boys and 25 girls, were asked which sport they prefer. The results are shown in the table.

	Athletics	Football	Swimming	Tennis
Boy	4	9	2	10
Girl	3	3	12	7

- (a) A student is selected at random.

Calculate the probability that the student chosen is

- (i) a girl who prefers swimming,

..... [1]

- (ii) a boy who **does not** prefer football,

..... [1]

- (iii) a student who prefers athletics.

..... [1]

- (b) Two of the girls are chosen at random.

Calculate the probability they both prefer tennis.

..... [2]

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- (c) Two of the students who prefer athletics are chosen at random.

Calculate the probability that one is a boy and one is a girl.

..... [3]

- (d) Three of the 50 students are chosen at random.

Calculate the probability that one is a boy and two are girls and they all prefer swimming.

..... [4]

12

- 6** Herman bought a motorbike on 1 January 2014.
By 1 January 2015 the value of the motorbike had reduced by 16%.
By 1 January 2016 the value of the motorbike had reduced by 12% of the value on 1 January 2015.
The value of the motorbike on 1 January 2016 was \$7392.

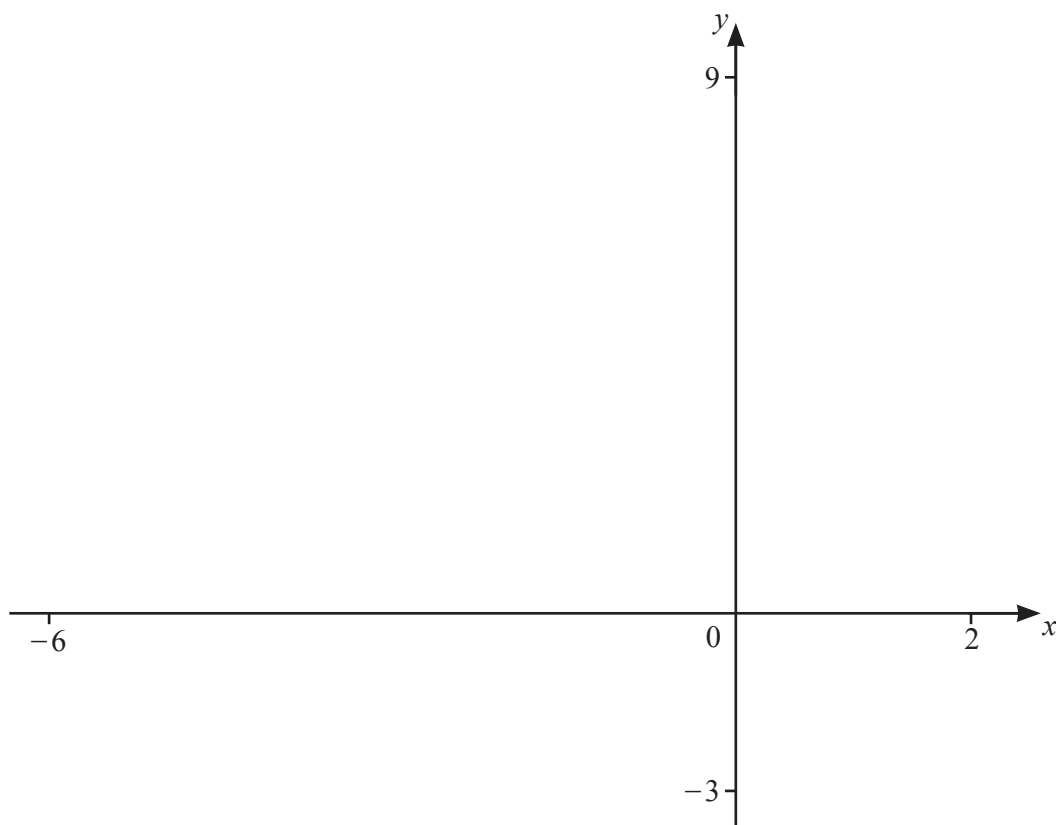
(a) Find how much Herman paid for the motorbike.

\$ [3]

(b) From 2016, the value of the motorbike reduced by 8% each year.

Calculate the number of complete years it will take for the value of the motorbike to decrease from \$7392 to \$5000.

..... [4]



(a) $f(x) = 2 + \frac{1}{x+2}$

(i) On the diagram, sketch the graph of $y = f(x)$ for values of x between -6 and 2 . [2]

(ii) Write down the coordinates of the points where the graph crosses the axes.

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

(iii) Write down the equations of the asymptotes of the graph.

....., [2]

(b) $g(x) = (x+4)^2$

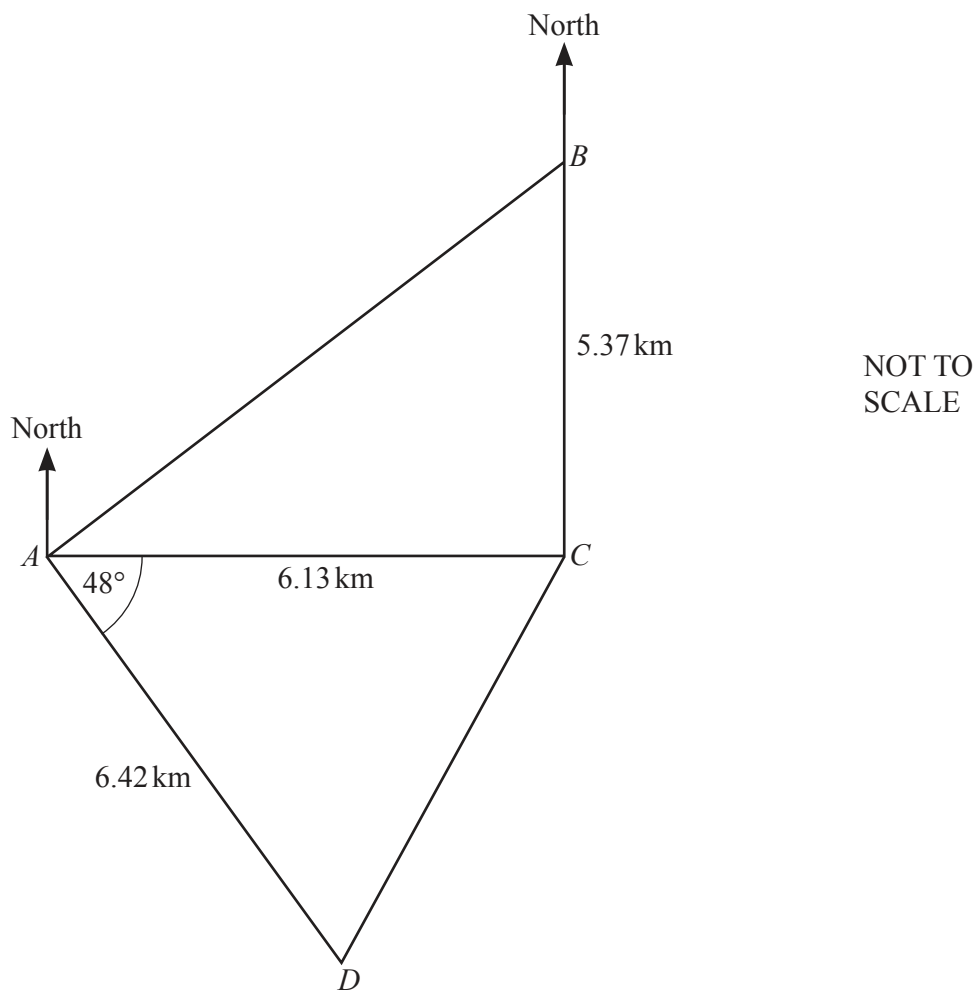
On the diagram, sketch the graph of $y = g(x)$ for $-6 \leq x \leq -1$. [2]

(c) Solve the equation.

$f(x) = g(x)$ [3]

(d) Solve the inequality.

$f(x) \geq g(x)$ [2]



The diagram shows four points A , B , C and D on horizontal ground.

B is due North of C and C is due East of A .

(a) Find the bearing of

(i) D from A ,

..... [1]

(ii) A from D .

..... [1]

(b) Calculate angle ABC .

Angle $ABC =$ [2]

15**(c)** Calculate the area of quadrilateral $ABCD$ km^2 [3]**(d)** Calculate CD . $CD =$ km [3]**(e)** Angle ACD is acute.Find the bearing of D from C .

..... [4]

16

9 $f(x) = 4 - 3x$ $g(x) = \frac{1}{x-1}, x \neq 1$ $h(x) = x^2$

(a) Find

(i) $f(2),$

..... [1]

(ii) $f(g(4)).$

..... [2]

(b) Find $g(g(-1)).$

..... [2]

(c) Solve.

$h(f(x)) = 9$

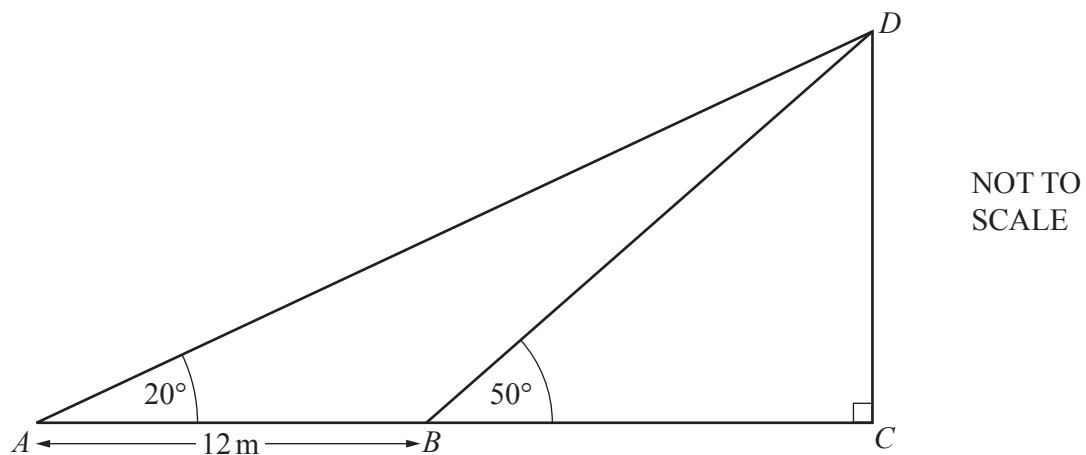
$x = \dots\dots\dots \text{ or } x = \dots\dots\dots$ [3]

(d) Find $(f(x))^2 - 1$ in terms of x .Give your answer in the form $k(ax + b)(cx + d)$ where a, b, c, d and k are integers.

..... [3]

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10



The diagram shows a vertical pole CD .
 ABC is a straight line on level ground.

Find DC .

$DC = \dots\dots\dots\text{ m}$ [6]

11 (a) Solve the equations.

(i) $5 + 2x = 1$

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

(ii) $6 - \frac{10}{x} = 1$

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

(iii) $3(1 - 2x) = 2 - 4(x - 7)$

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

(b) (i) Solve $6x^2 = 7 - 3x$.

Give your answers correct to 3 decimal places.
You must show all your working.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

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(ii) Solve $6y^4 = 7 - 3y^2$.

Give your answers correct to 3 decimal places.

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

(c) Solve $2\log x + \log 5 = 1$.

$x = \dots\dots\dots$ [4]

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