Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

1152731180

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2022**

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. Any blank pages are indicated.

DC (RW/JG) 303207/1

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. $\quad A = \pi rl$

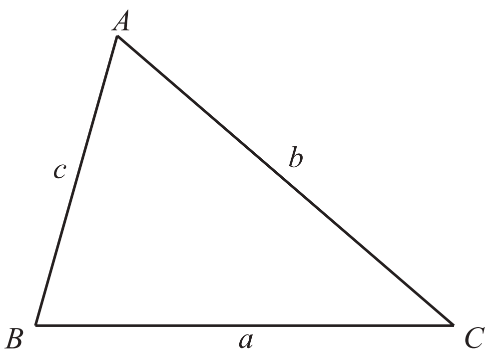
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 **(a)** Anneka invests \$2500 in an account paying compound interest at a rate of 1.6% per year.

Find the amount in the account at the end of 3 years.

\$ .... [2]

(b) Bashir invests \$2500 in an account paying simple interest at a rate of r% per year.
At the end of 5 years the amount in the account is \$2718.75 .

Calculate the value of r.

r = ... [3]

(c) Chanda invests \$2500 in an account paying compound interest at a rate of 1.55% per year.

Find the number of complete years until Chanda's investment is first worth more than \$4000.

.... [4]

2 The heights, h cm, of 100 seedlings are shown in the table.

h cm	Frequency
$4.5 < h \leqslant 5.5$	9
$5.5 < h \leqslant 6.5$	18
$6.5 < h \leqslant 7.5$	27
$7.5 < h \leqslant 8.5$	19
$8.5 < h \leqslant 9.5$	16
$9.5 < h \leqslant 10.5$	11
Total	100

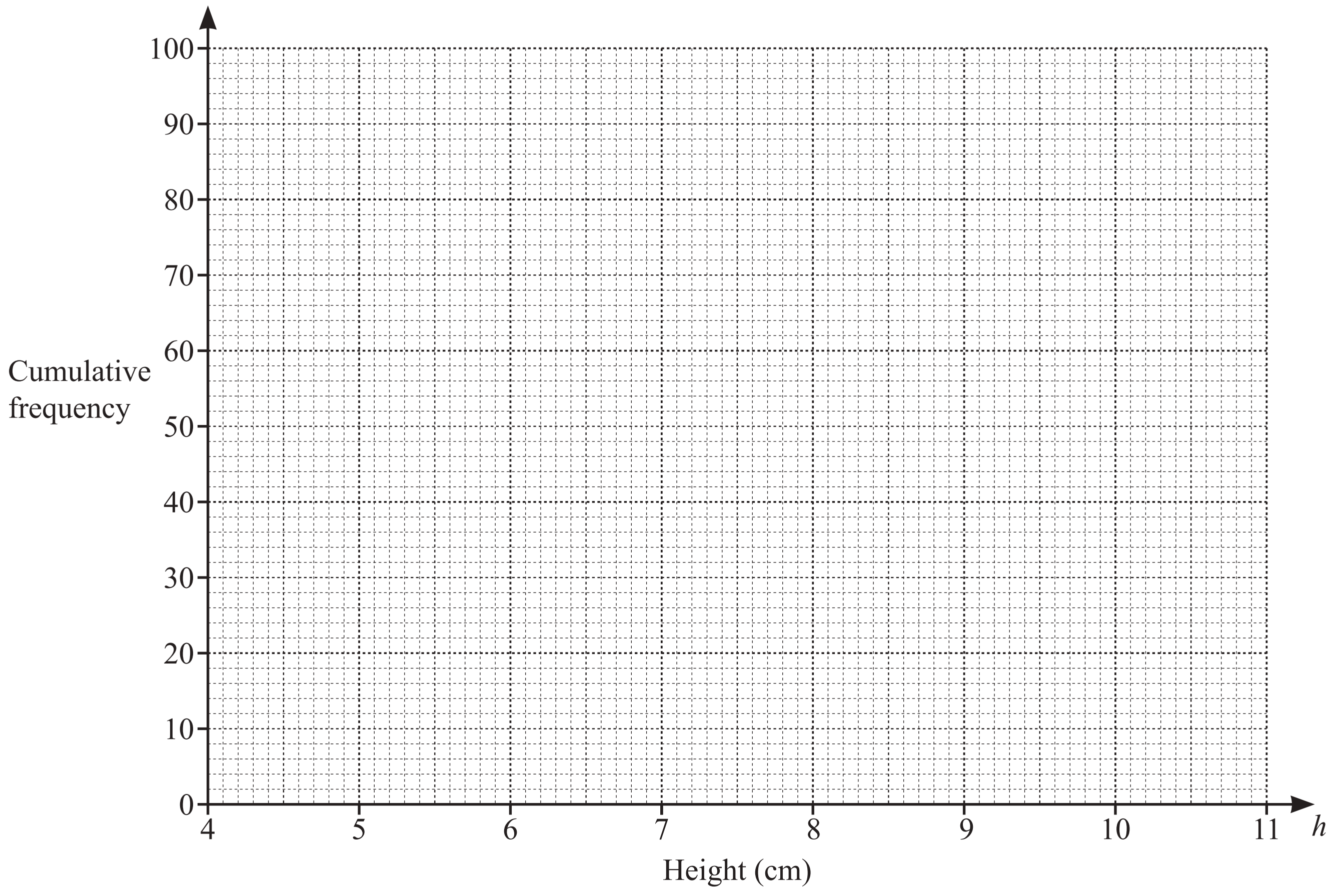
(a) Calculate an estimate for the mean.

.... cm [2]

(b) Write down the modal group.

.... $< h \leqslant$ .... [1]

(c) **(i)** Draw a cumulative frequency curve for the heights of the seedlings.



[4]

(ii) Use your curve to estimate the median.

.... cm [1]

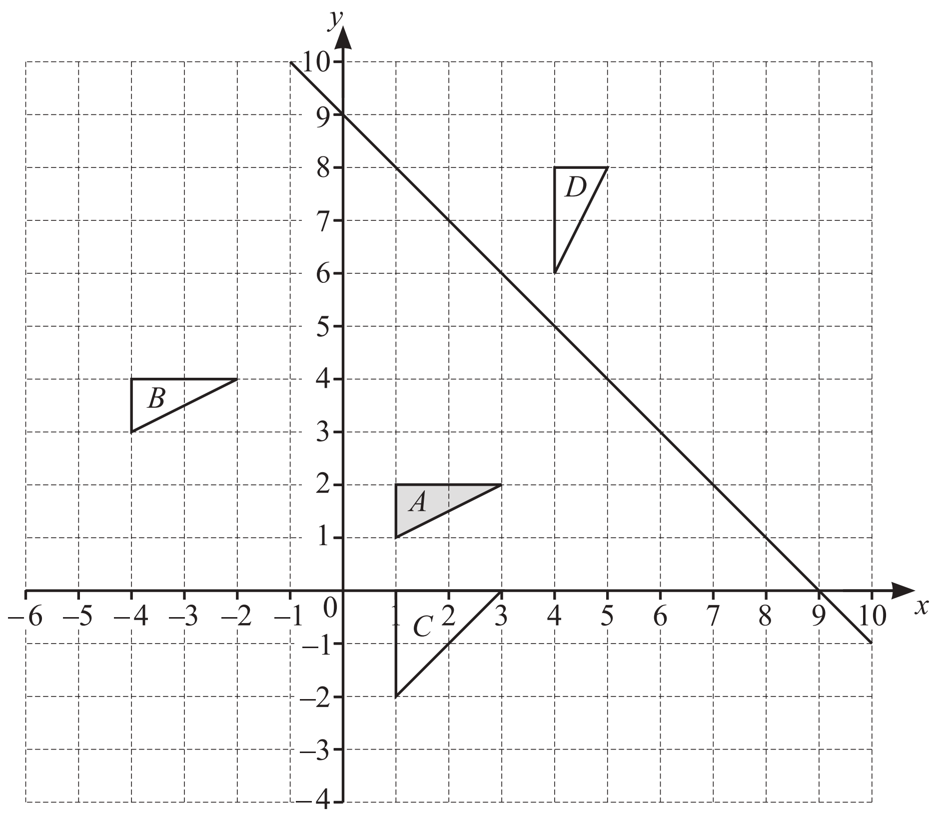
(iii) Use your curve to estimate the interquartile range.

.... cm [2]

(iv) Find an estimate of the percentage of the seedlings that were more than 8 cm in height.

.... % [2]

3



The diagram shows triangles *A*, *B*, *C* and *D* and the line with equation $x+y=9$.

(a) Enlarge triangle *A* with centre (4, 3) and scale factor 3. [2]

(b) Describe fully the **single** transformation that maps triangle *A* onto

(i) triangle *B*,

....

.... [2]

(ii) triangle *C*.

....

.... [3]

(c) Triangle *A* can be mapped onto triangle *D* by
a rotation of 90° clockwise about a point on the line $x+y=9$ followed by a reflection.

Find one possible centre of rotation and the equation of the corresponding mirror line.

Centre (...................... , ...)

Equation of mirror line .... [2]

4 **(a)** Solve $4x - 3 = 7$.

$x =$ .... [2]

(b) $y = \dfrac{3x+1}{z}$

Find the value of y when $x = 4.3$ and $z = -2$.

$y =$ .... [2]

(c) Solve the simultaneous equations.
You must show all your working.

$$4x - 3y = 14$$
$$3x + 5y = 25$$

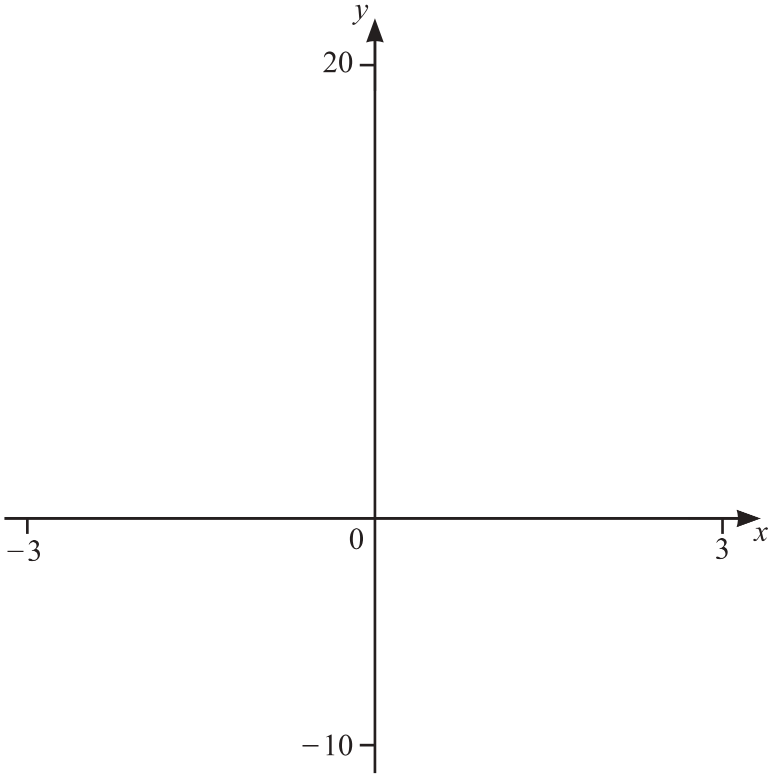
$x =$ ....

$y =$ .... [4]

(d) Simplify $\dfrac{2x^2 + 4x}{5y^2} \div \dfrac{x^2 - 4}{10y}$.

.... [4]

5



$f(x) = x^3 - 5x + 3$ for $-3 \leqslant x \leqslant 3$

(a) On the diagram, sketch the graph of $y = f(x)$. [2]

(b) Find the coordinates of the local maximum.

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

(c) Describe fully the symmetry of the graph of $y = f(x)$.

....

.... [3]

(d) Find the zeros of the graph of $y = f(x)$.

.... [3]

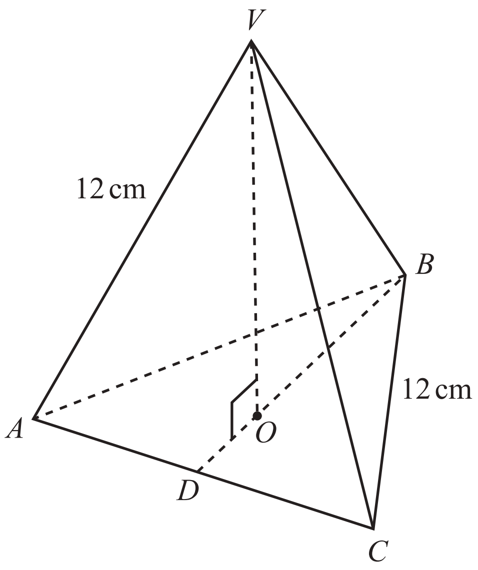
(e) $g(x) = x^2 - 2x + 2$ for $-3 \leqslant x \leqslant 3$

(i) On the same diagram, sketch the graph of $y = g(x)$. [2]

(ii) Use your graphs to solve $x^3 - x^2 - 3x + 1 = 0$.

.... [3]

6



NOT TO SCALE

VABC is a pyramid with a triangular base.
All the edges have length 12 cm.
O is vertically below *V*.
D is the mid-point of *AC* and $BO = \frac{2}{3}BD$.

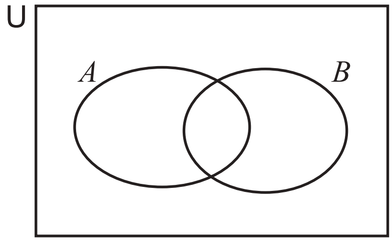
(a) Show that $BO = 6.928$ cm, correct to 3 decimal places.

[4]

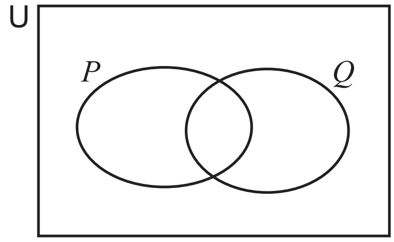
(b) Calculate the volume of the pyramid.

.... cm^3 [4]

7 **(a)** Shade the region indicated below each of these Venn diagrams.

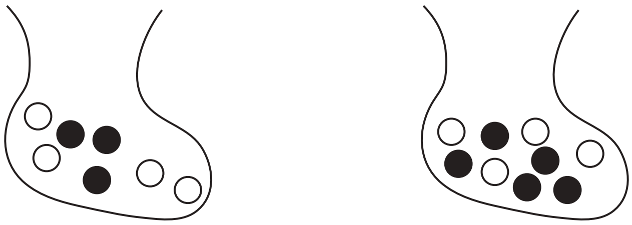


$(A \cup B)'$



$(P \cap Q') \cup (P' \cap Q)$ [2]

(b)



Bag A Bag B

Bag A contains 4 white balls and 3 black balls.
Bag B contains 4 white balls and 5 black balls.

A ball is taken at random from bag A.
If the ball is white, it is replaced in Bag A.
If the ball is black, it is put in bag B.

A ball is then taken at random from bag B.

Find the probability that

(i) the ball taken from bag A is white,

.... [1]

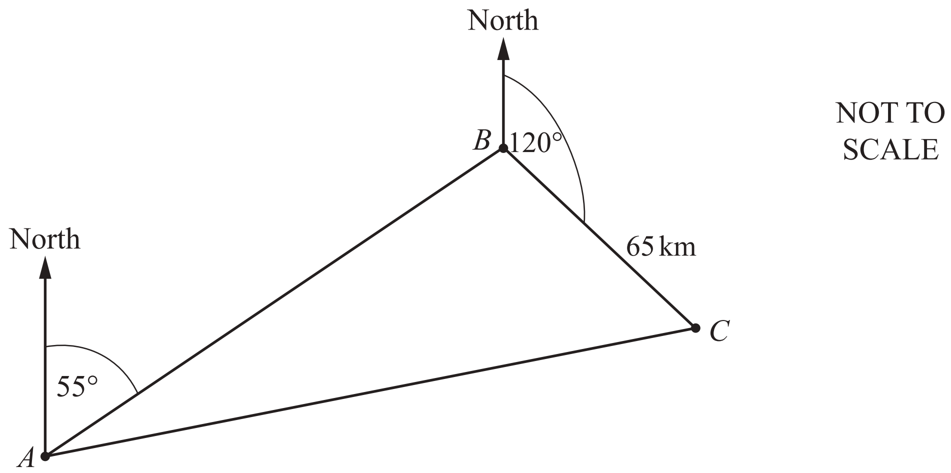
(ii) both balls are black,

.... [2]

(iii) the balls are different colours.

.... [3]

8



The diagram shows the route of a ship between three ports, A, B and C.
The bearing of B from A is 055° and the bearing of C from B is 120°.
$BC = 65$ km.

The ship takes 7 hours to sail from A to B.
It sails at a speed of 20 km/h.

(a) Find the distance AB.

.... km [1]

(b) Show that angle $ABC = 115°$.

[1]

(c) **(i)** Calculate the distance CA.

.... km [3]

(ii) Calculate the bearing of *A* from *C*.

.... [4]

(d) The ship takes 3.6 hours to sail from *B* to *C*.
It then sails from *C* to *A* at a speed of 21.5 km/h.

Find the average speed for the complete journey from *A* to *B* to *C* and back to *A*.

.... km/h [3]

9 $f(x) = 2 - 3x$ $g(x) = (x+1)^2$ $h(x) = \log x$

(a) Find.

(i) $f(-4)$

.... [1]

(ii) $f(g(3))$

.... [2]

(iii) $f^{-1}(4)$

.... [2]

(iv) $h^{-1}(2)$

.... [2]

(b) Solve $(f(x))^{-1} = 5$.

$x =$ .... [3]

(c) Find $g(f(x))$.
Write your answer in the form $ax^2 + bx + c$.

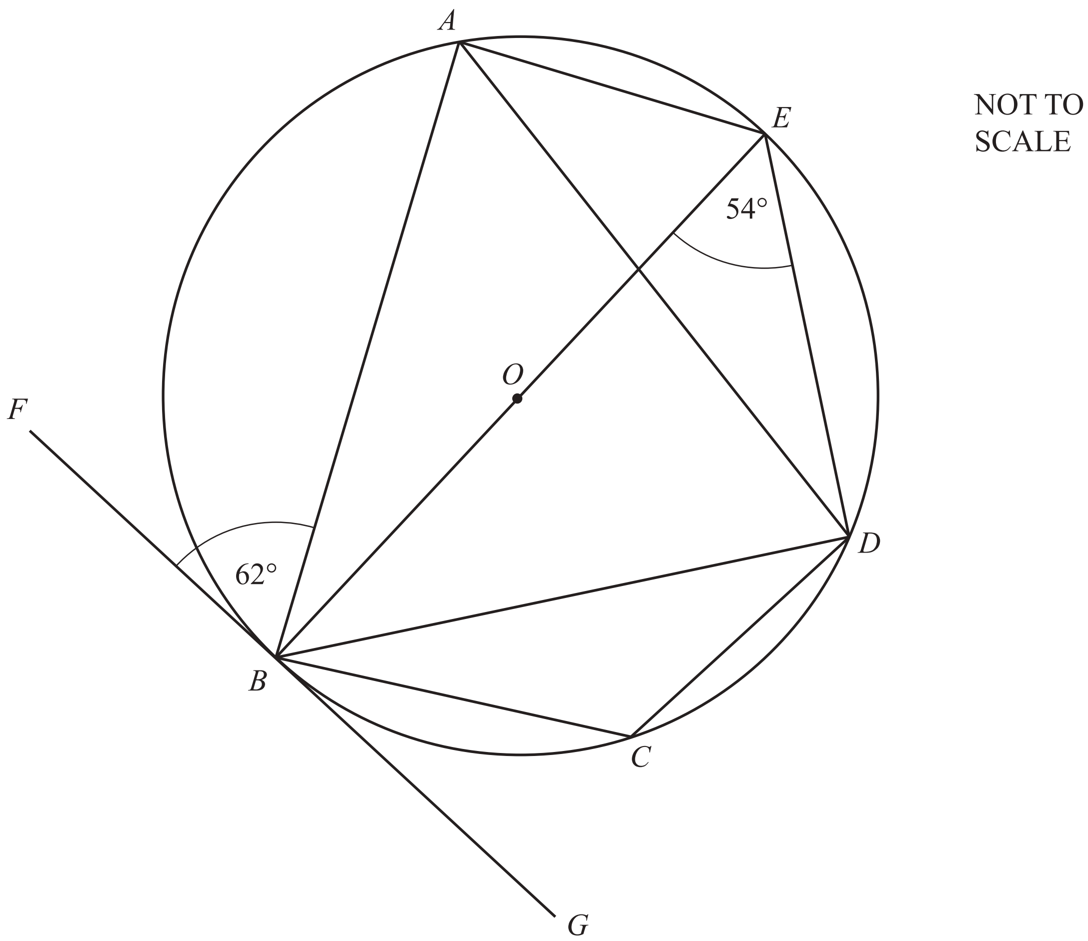
.... [3]

(d) $y = h(f(x))$

Find x in terms of y.

$x =$ .... [3]

10 (a)



A, B, C, D and E are points on the circle centre O.
FBG is a tangent to the circle at B.
Angle $ABF = 62°$ and angle $BED = 54°$.

Find

(i) angle AEB,

Angle AEB = ... [1]

(ii) angle BAD,

Angle BAD = ... [1]

(iii) angle EAD,

Angle EAD = ... [1]

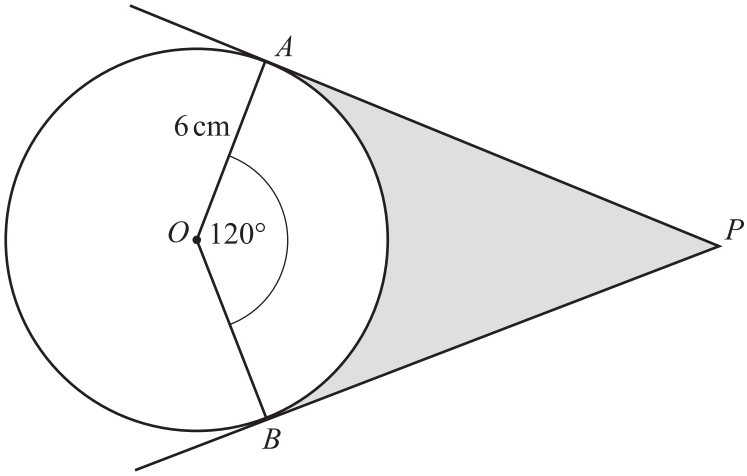
(iv) angle BCD,

Angle BCD = ... [1]

(v) angle FBD.

Angle FBD = ... [1]

(b)



NOT TO SCALE

PA and *PB* are tangents to the circle centre *O*.
The radius of the circle is 6 cm and angle *AOB* = 120°.

The shaded area = $(a\sqrt{3} - b\pi)\ \text{cm}^2$.

Find the value of *a* and the value of *b*.

a = ...

b = ... [5]

11 A tank has a capacity of 400 litres.

Water from Tap A flows at x litres per minute.
Water from Tap B flows at 2 litres per minute **less** than the water from tap A.

(a) Write down an expression in terms of x for the time, in minutes, for tap A to fill the tank.

.... [1]

(b) Tap B takes 10 minutes longer to fill the tank than tap A.

Write down an equation in terms of x and show that it simplifies to

$$x^2 - 2x - 80 = 0.$$

[4]

(c) Solve $x^2 - 2x - 80 = 0$ and find the time it takes to fill the tank when both taps are turned on.
Give your answer in minutes and seconds, correct to the nearest second.

.... minutes .... seconds [4]