

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Centre Number		Candidate Number	
Pearson Edexcel Level 1/Level 2 GCSE (9–1)			
Aiming for 9 – Spring 2020 practice paper			
Morning (Time: 1 hour 30 minutes)		Paper Reference 1MA1/2H	
Mathematics Paper 2 (Calculator) Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.			Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**



Information

- The total mark for this paper is 80. There are 23 questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by Grade 7 students in June and November examinations.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** The equation of a curve is $y = a^x$
 A is the point where the curve intersects the y -axis.

(a) State the coordinates of A .

(..... ,)
(1)

The equation of circle **C** is $x^2 + y^2 = 16$

The circle **C** is translated by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ to give circle **B**.

(b) Draw a sketch of circle **B**.

Label with coordinates

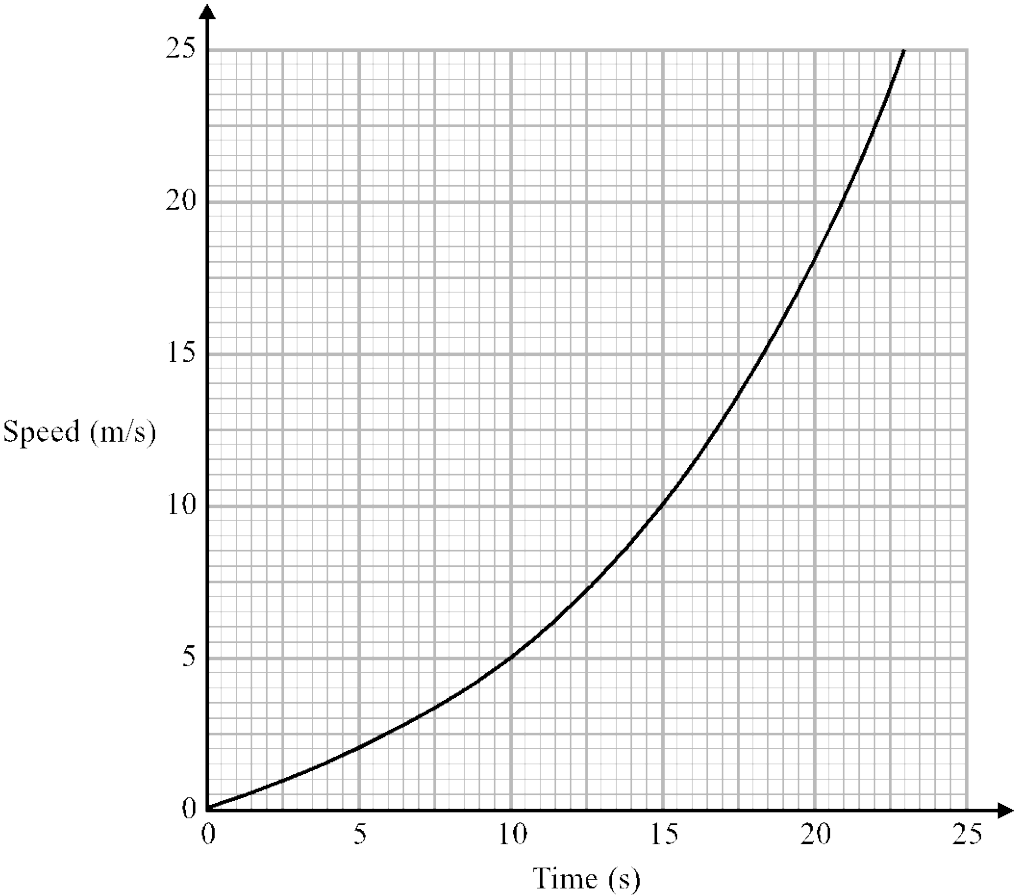
the centre of circle **B**

and any points of intersection with the x -axis.

(3)

(Total for Question 1 is 4 marks)

2 Here is a speed-time graph for a train.



- (a) Work out an estimate for the distance the train travelled in the first 20 seconds.
Use 4 strips of equal width.

..... m
(3)

- (b) Is your answer to (a) an underestimate or an overestimate of the actual distance the train travelled?
Give a reason for your answer.

.....
.....
(1)

(Total for Question 2 is 4 marks)

3 At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.

At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

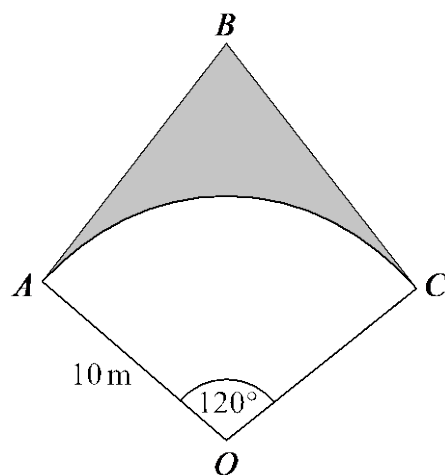
$$V_0 = 2000$$

$$V_{t+1} = kV_t$$

write down the value of k .

$k = \dots\dots\dots$

(Total for Question 3 is 1 mark)



OAC is a sector of a circle, centre O , radius 10 m.

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

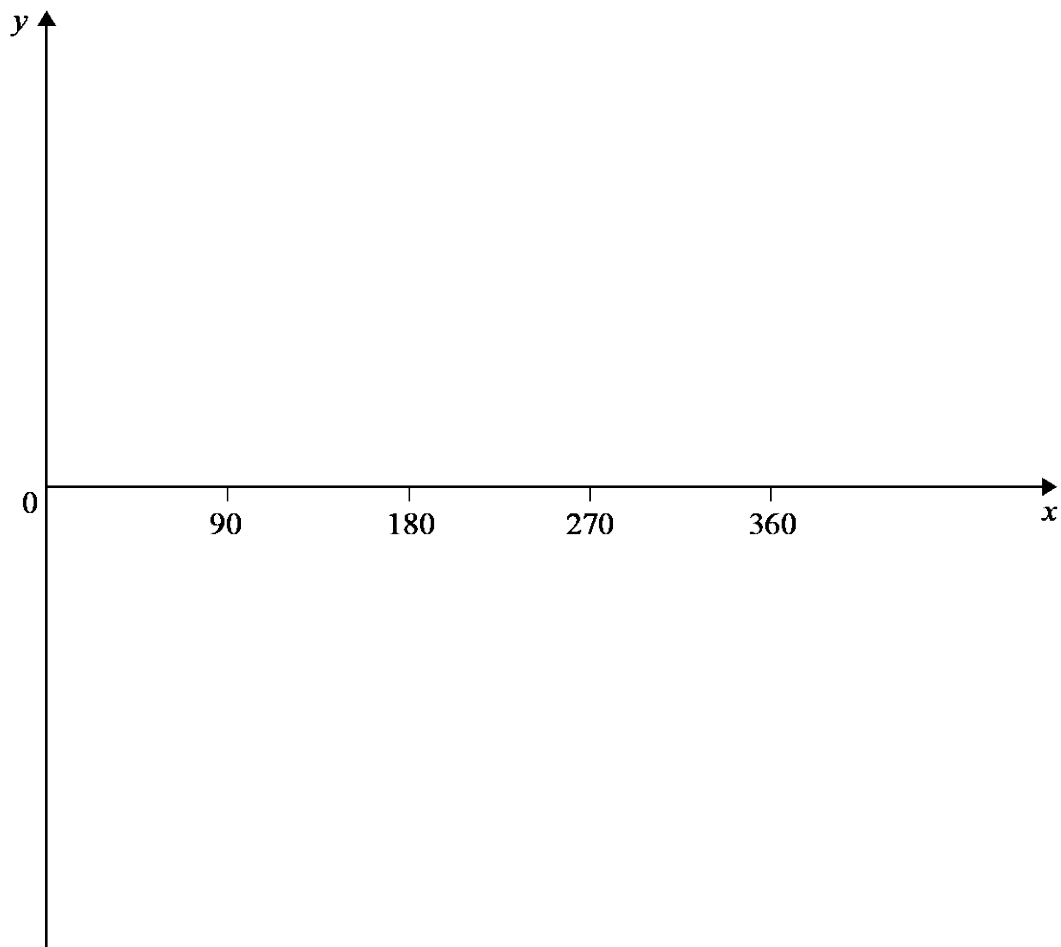
Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

.....m²

(Total for Question 4 is 5 marks)

- 5 Sketch the graph of $y = \tan x^\circ$ for $0 \leq x \leq 360$



(Total for Question 5 is 2 marks)

6 $2 - \frac{x+2}{x-3} - \frac{x-6}{x+3}$ can be written as a single fraction in the form $\frac{ax+b}{x^2-9}$

where a and b are integers.

Work out the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

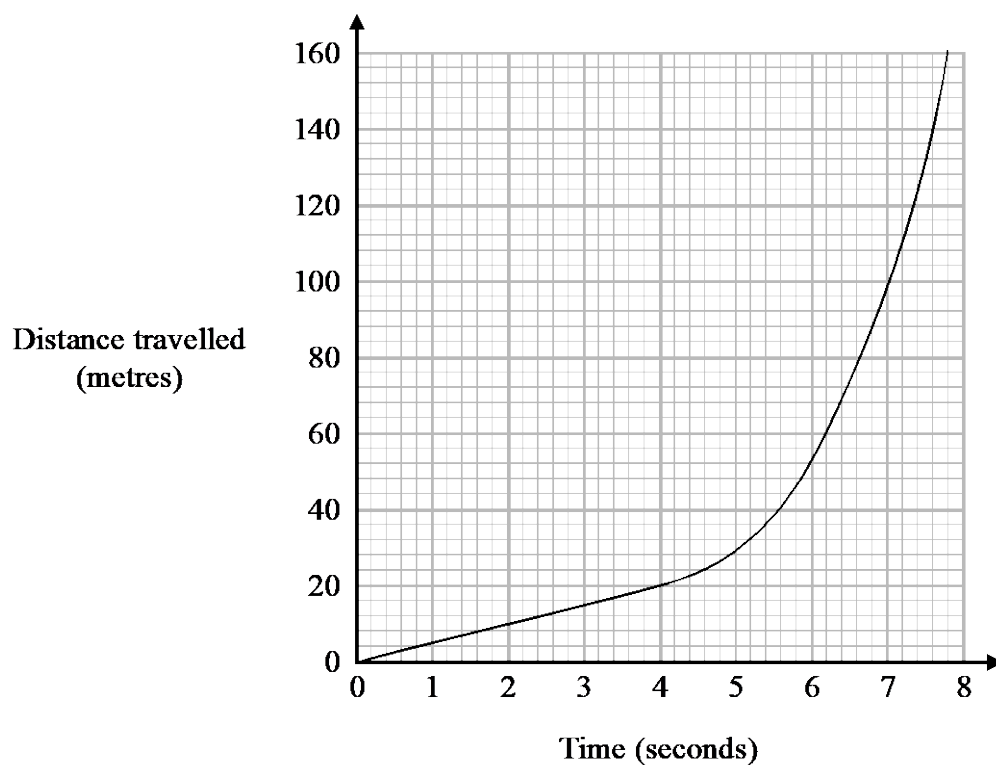
(Total for Question 6 is 4 marks)

7 $16^{\frac{1}{5}} \times 2^x = 8^{\frac{3}{4}}$

Work out the exact value of x .

.....
(Total for Question 7 is 3 marks)

- 8 The distance-time graph shows information about part of a car journey.



Use the graph to estimate the speed of the car at time 5 seconds.

..... m/s

(Total for Question 8 is 3 marks)

- 9 Here are two similar solid shapes.

A



B



surface area of shape **A** : surface area of shape **B** = 3 : 4

The volume of shape **B** is 10 cm^3

Work out the volume of shape **A**.

Give your answer correct to 3 significant figures.

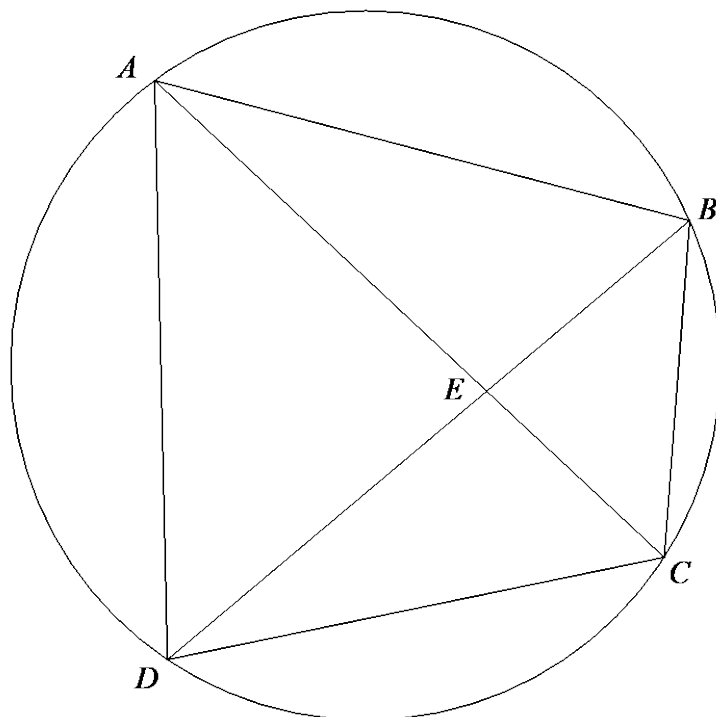
..... cm^3

(Total for Question 9 is 3 marks)

- 10** When a biased coin is thrown 4 times, the probability of getting 4 heads is $\frac{16}{81}$
Work out the probability of getting 4 tails when the coin is thrown 4 times.

.....
(Total for Question 10 is 2 marks)

- 11 A, B, C and D are four points on the circumference of a circle.



AEC and BED are straight lines.

Prove that triangle ABE and triangle DCE are similar.
You must give reasons for each stage of your working.

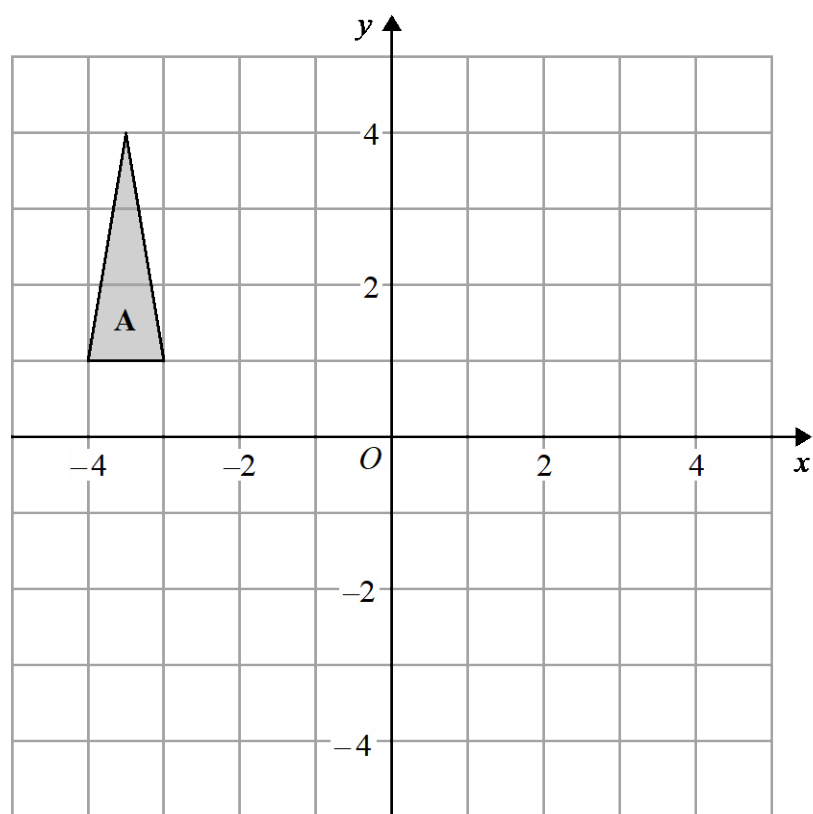
(Total for Question 11 is 3 marks)

12 The n th term of a sequence is $2n^2 - 1$

The n th term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

(Total for Question 12 is 3 marks)



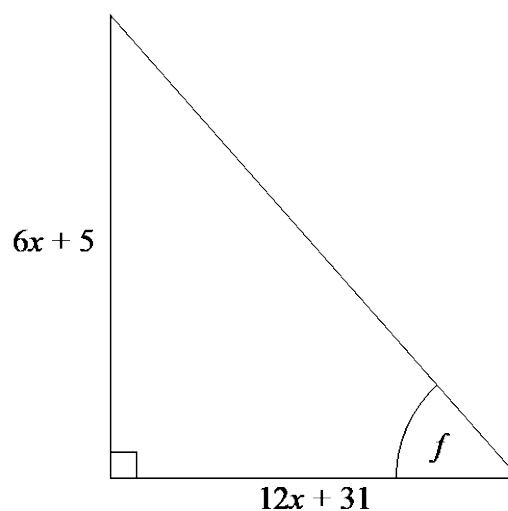
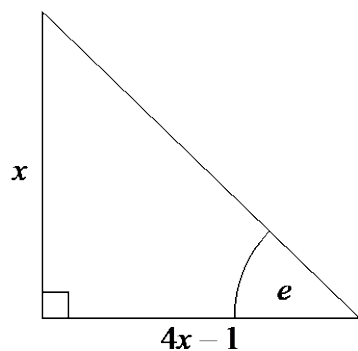
Triangle A is transformed by the combined transformation of a rotation of 180° about the point $(-2, 0)$ followed by a translation with vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$

One point on triangle A is invariant under the combined transformation.
Find the coordinates of this point.

(..... ,)

(Total for Question 13 is 2 marks)

- 14 Here are two right-angled triangles.



Given that

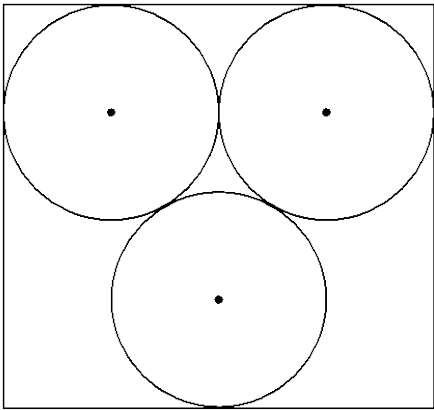
$$\tan e = \tan f$$

find the value of x .

You must show all your working.

.....
(Total for Question 14 is 5 marks)

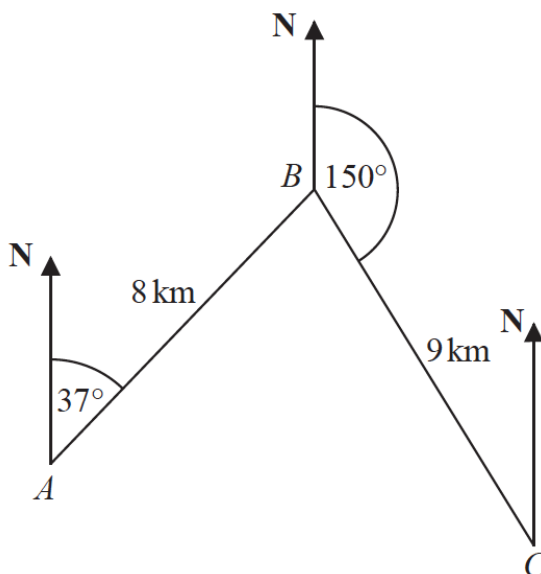
- 15 The diagram shows 3 identical circles inside a rectangle. Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each circle is 24 mm.
Work out the area of the rectangle.
Give your answer correct to 3 significant figures.

..... mm²
(Total for Question 15 is 4 marks)

- 16 The diagram shows the positions of three towns, Acton (A), Barston (B) and Chorlton (C).

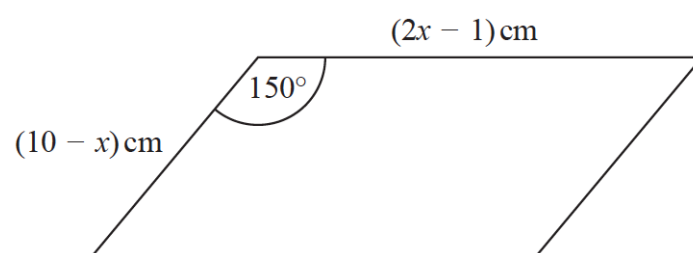


Barston is 8 km from Acton on a bearing of 037°
Chorlton is 9 km from Barston on a bearing of 150°

Find the bearing of Chorlton from Acton.
Give your answer correct to 1 decimal place.
You must show all your working.

.....^o
(Total for Question 16 is 5 marks)

- 17 The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

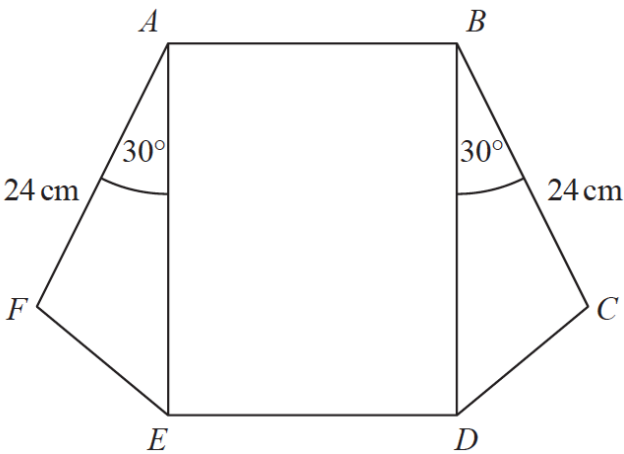
(b) Find the range of possible values of x .

(3)

.....
(3)

(Total for Question 17 is 6 marks)

18 The diagram shows a rectangle, $ABDE$, and two congruent triangles, AFE and BCD .



area of rectangle $ABDE$ = area of triangle AFE + area of triangle BCD

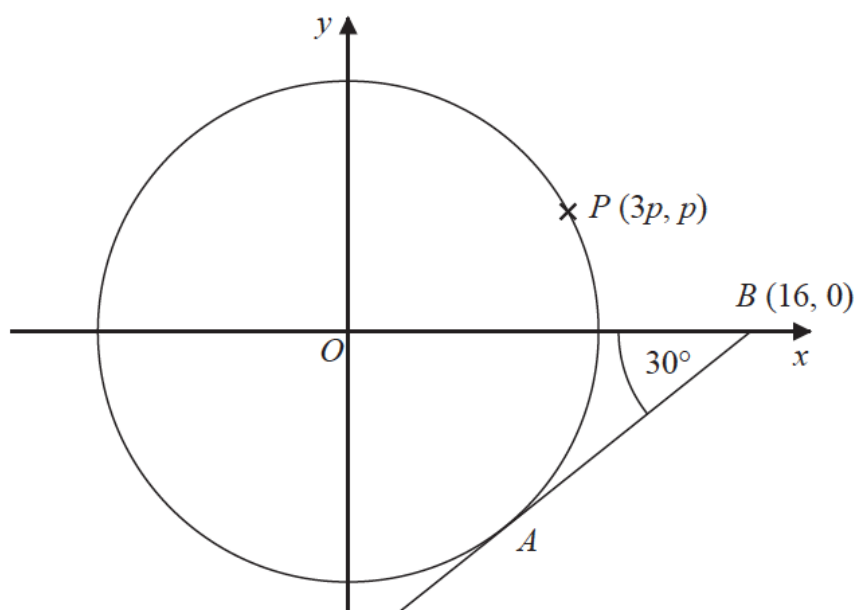
$$AB : AE = 1 : 3$$

Work out the length of AE .

..... cm

(Total for Question 18 is 4 marks)

- 19 The diagram shows a circle, centre O .



AB is the tangent to the circle at the point A .

Angle $OBA = 30^\circ$

Point B has coordinates $(16, 0)$

Point P has coordinates $(3p, p)$

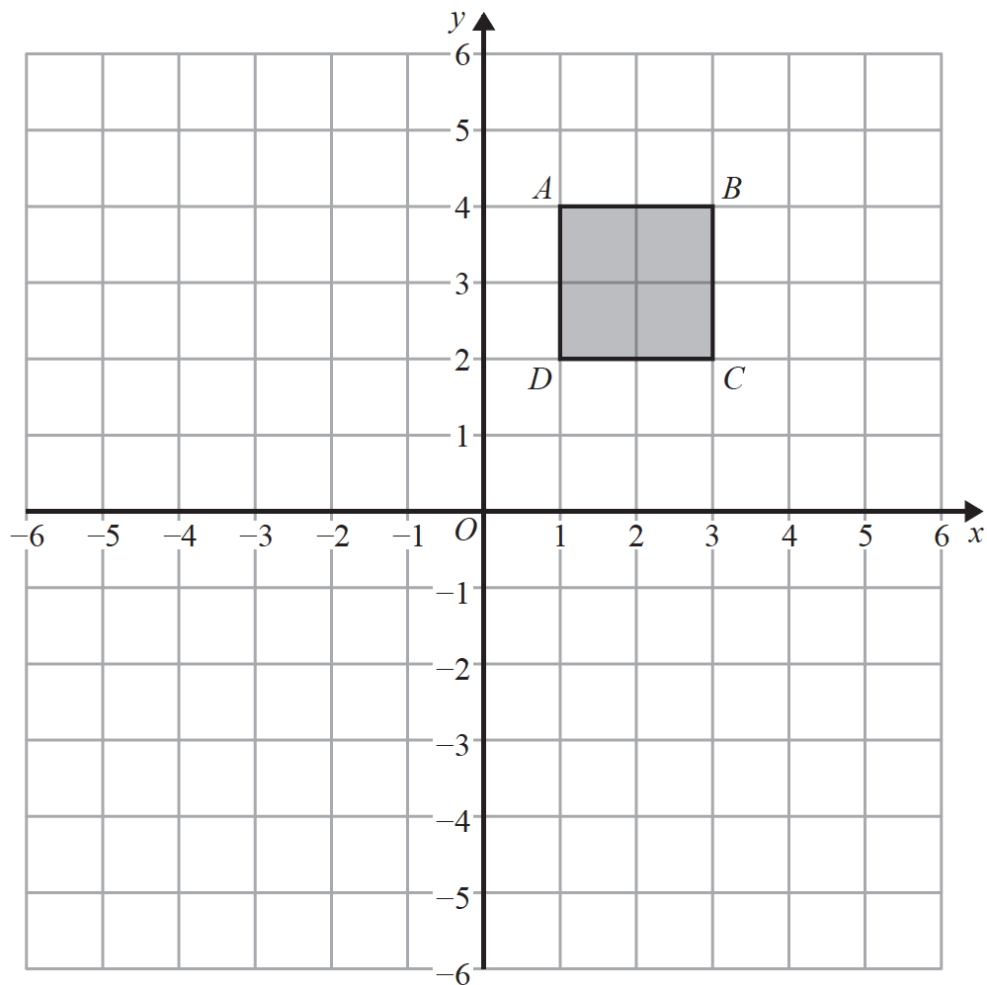
Find the value of p .

Give your answer correct to 1 decimal place.

You must show all your working.

$p = \dots\dots\dots$

(Total for Question 19 is 4 marks)



Square $ABCD$ is transformed by a combined transformation of a reflection in the line $x = -1$ followed by a rotation.

Under the combined transformation, two vertices of the square $ABCD$ are invariant. Describe fully one possible rotation.

.....

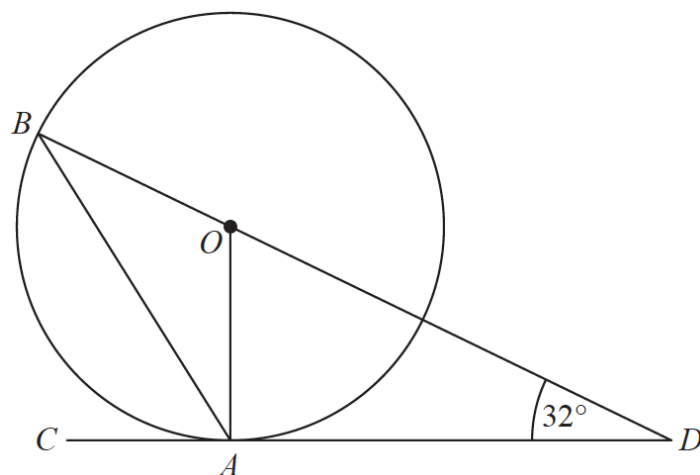
(Total for Question 20 is 2 marks)

21 **L** is the circle with equation $x^2 + y^2 = 4$

$P\left(\frac{3}{2}, \frac{\sqrt{7}}{2}\right)$ is a point on **L**.

Find an equation of the tangent to **L** at the point P .

.....
(Total for Question 21 is 3 marks)

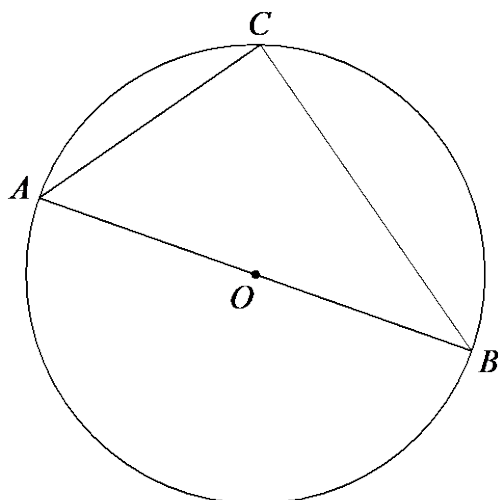


A and B are points on a circle with centre O .
 CAD is the tangent to the circle at A .

BOD is a straight line.
 Angle $ODA = 32^\circ$

Work out the size of angle CAB .
 You must show all your working.

.....^o
 (Total for Question 22 is 3 marks)



A , B and C are points on the circumference of a circle, centre O .
 AOB is a diameter of the circle.

Prove that angle ACB is 90°

You must **not** use any circle theorems in your proof.

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS