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Thursday 26 May 2016 – Morning

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour

A502/02

5999054497

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your quality of written communication is assessed in questions marked with an asterisk (*****).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

WARNING

No calculator can be used for this paper

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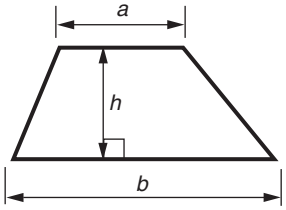
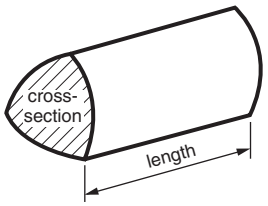
Formulae Sheet: Higher Tier

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = (area of cross-section) × length

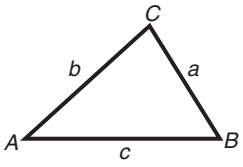


In any triangle *ABC*

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

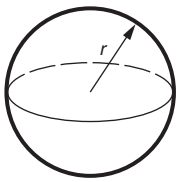
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



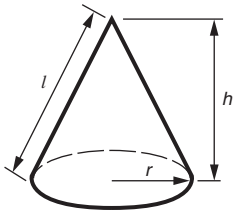
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

PLEASE DO NOT WRITE ON THIS PAGE

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Answer **all** the questions.

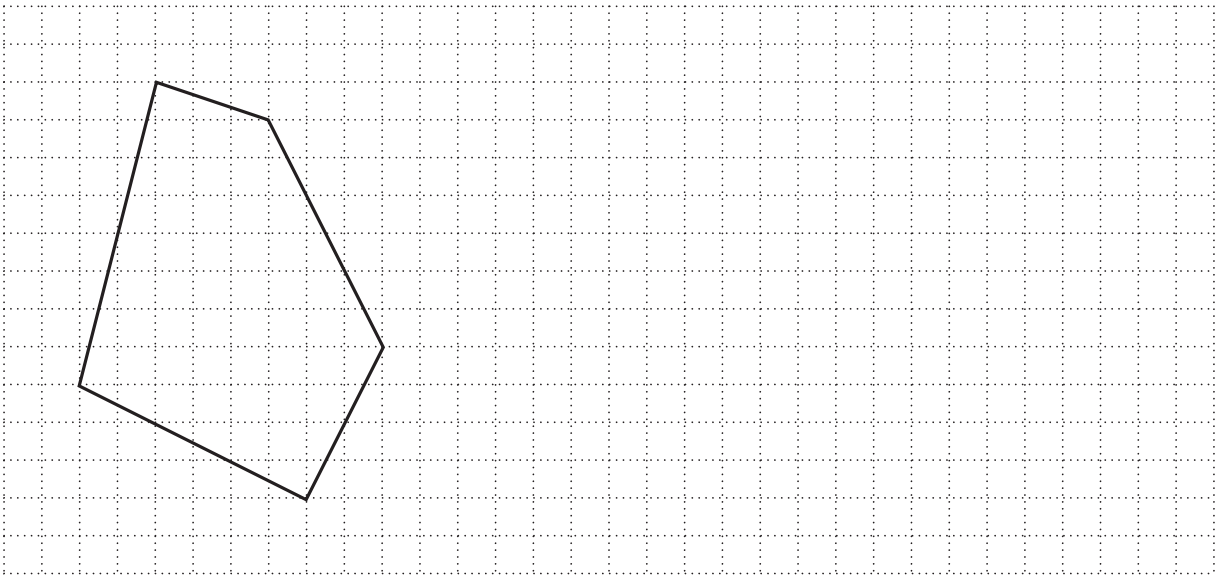
1 **(a)** Complete this table to show which properties are true for none, some or all examples of a particular **quadrilateral**.

The first row is completed for you.

Quadrilateral	Property	True for none, some or all
Square	Diagonals meet at right angles	All
Rhombus	All sides are equal length	
Trapezium	Has at least one right angle	
	They are mathematically similar	All
Kite		All

[4]

(b) Draw a shape that is **congruent** to this one.



[1]

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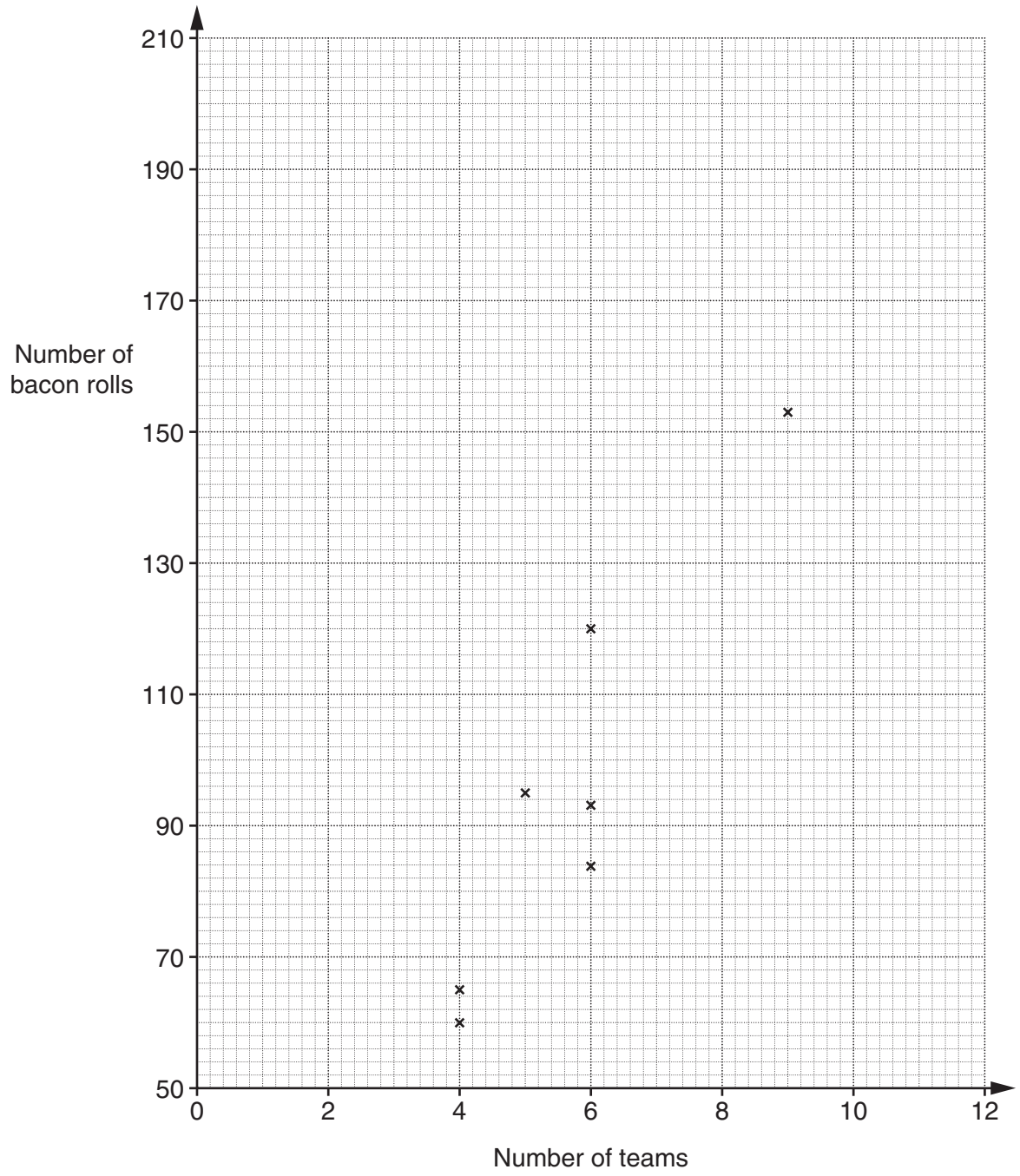
2 The *Tigers* rugby club provides bacon rolls on match days.

The organisers recorded how many bacon rolls they provided when different numbers of teams played.

Number of teams	4	4	5	6	6	6	9	9	11	12	12
Number of bacon rolls	60	65	95	84	93	120	153	117	176	156	206

The first 7 values are plotted on a scatter graph.



(a) Complete the scatter graph. **[2]**

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(b) What type of correlation is there between the number of teams and the number of bacon rolls?

(b) ..... **[1]**

(c) Draw a line of best fit on your scatter graph. **[1]**

(d) The club buys bacon rolls in packs of 6. Each pack costs £4.
There are 8 teams playing on one match day.

Use your line of best fit to help you work out how much it costs the club to provide bacon rolls on that day.

(d) £ ..... **[4]**

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3 **(a)** In one month, Nadia drives to work on 24 days.
Her car starts first time on 18 of these days.

On what fraction of the 24 days does her car **not** start first time?
Give your answer in its simplest form.

(a) ..... **[2]**

(b) Nadia drives $\frac{1}{5}$ of a mile through her estate and then another $\frac{2}{3}$ of a mile to reach the main road.

How far does she drive altogether before she reaches the main road?
Give your answer as a fraction of a mile.

(b) ..... **[2]**

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(c)* Nadia records, as an integer, the total number of miles she drives each week.
She then divides this by the number of days she drives.
This gives the average number of miles for each day she drives that week.

One week her average is $11.8\dot{3}$.

Work out the integer number of miles that Nadia records this week, and the number of days she drives this week. **[5]**

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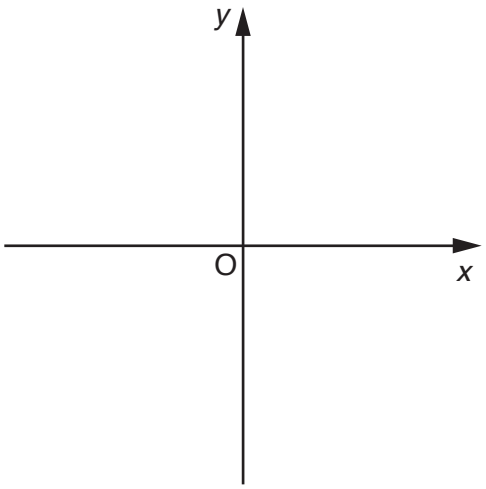
4 **(a)** **(i)** Sketch the graph of $y = -x + 4$. Mark the value where the line crosses the y-axis.



[2]

(ii) Write down the gradient of the line $y = -x + 4$.

(a)(ii) ..... **[1]**

(b) A plumber does three different tasks.
She records the time each task takes and the amount she charges.

Task	**A**	**B**	**C**
Time taken (t hours)	1	3	7
Amount charged (£c)	60	140	300

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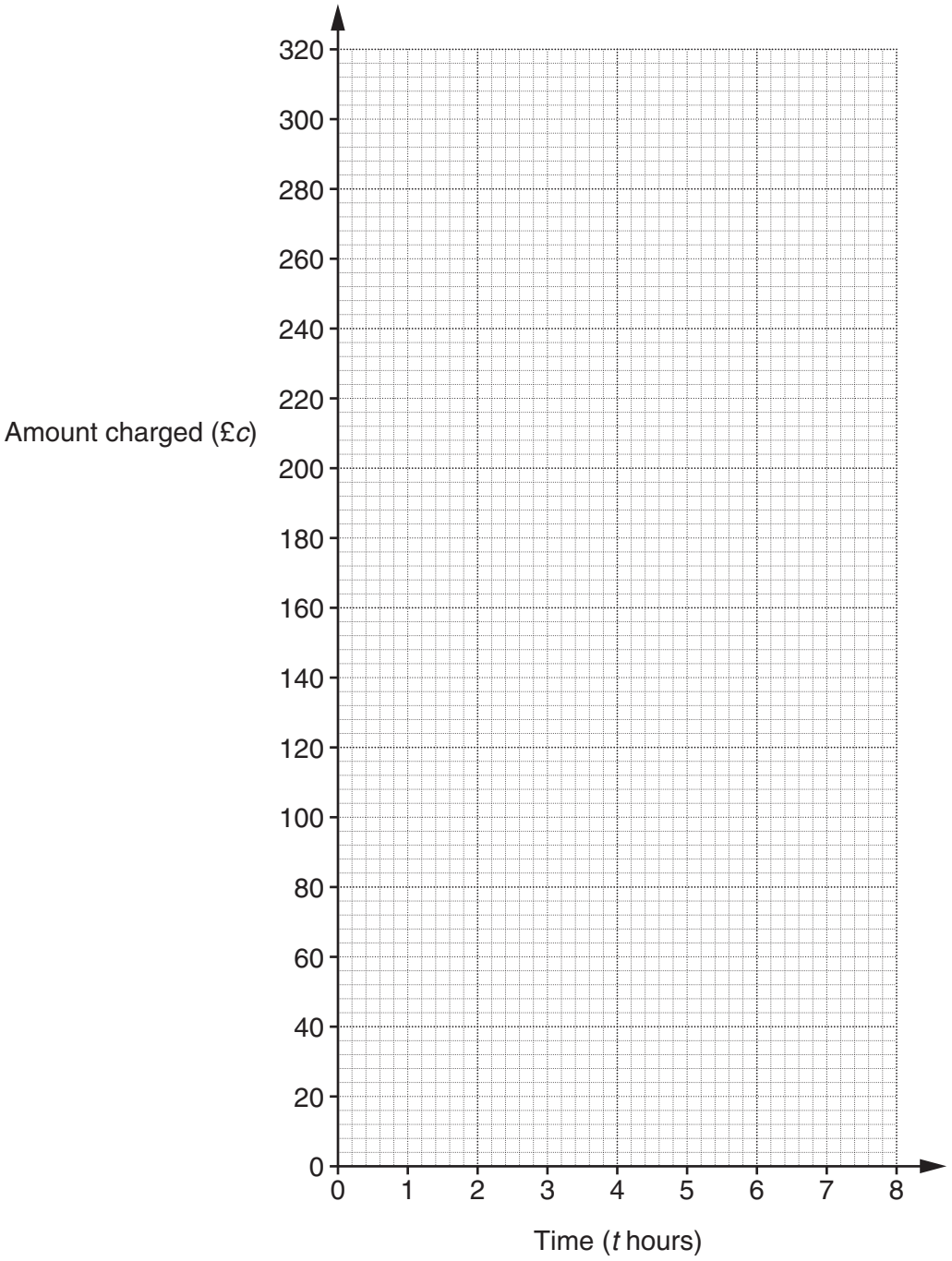
(i) Plot these values on the grid and draw a straight line through them.



[2]

(ii) The plumber charges a fixed call-out fee and an amount for each hour the task takes.

Complete the following.

The fixed call-out fee is £ ..... .

The amount for each hour is £ ..... . **[2]**

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5 **(a)** Archie is thinking of a number.
His number has no reciprocal.

(i) What number is Archie thinking of?

(a)(i) ..... **[1]**

(ii) Why does Archie's number have no reciprocal?

.....

..... **[1]**

(b) What is the negative square root of 196?

(b) ..... **[1]**

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6 In a regular polygon, the interior angle is fourteen times the exterior angle, $x°$.

Not to scale

Find x and hence find the sum of the interior angles of this polygon.

$x =$ .....

sum of interior angles = ... ° **[5]**

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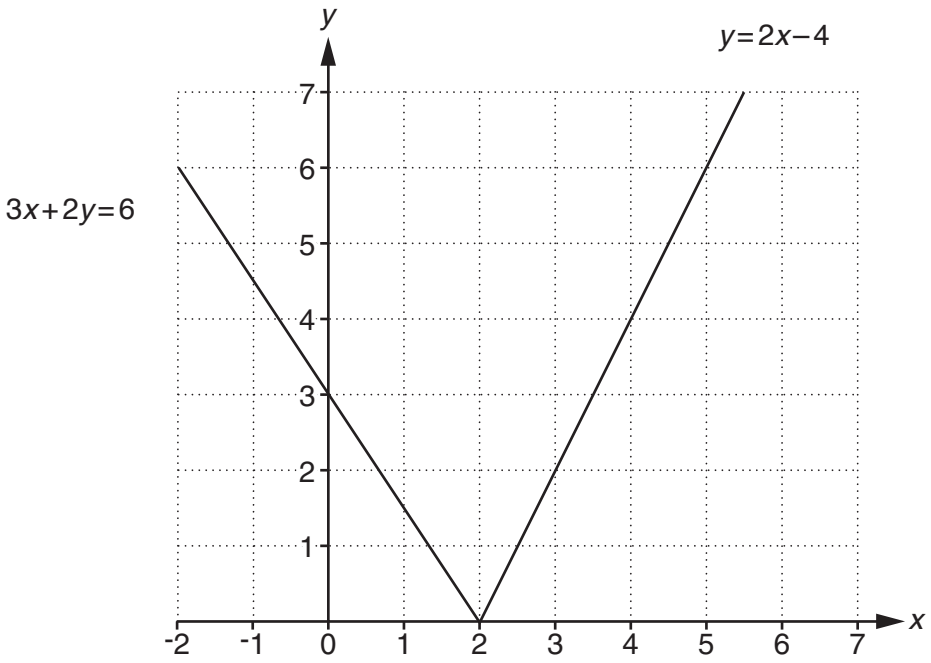
7 The diagram shows part of the graphs of $y = 2x - 4$ and $3x + 2y = 6$.



(a) On the grid, draw the graph of $y = 3$. **[1]**

(b) Indicate the area where the following are all true.
Shade the areas **not** required.

$3x + 2y \geqslant 6$

$y \geqslant 2x - 4$

$y \geqslant 3$

[3]

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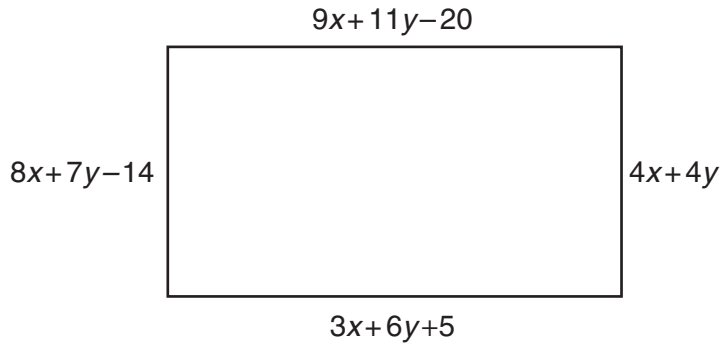
8 A rectangle has sides of length as shown in the diagram.



Not to scale

(a) Use the two shorter sides to show that $4x + 3y = 14$. **[1]**

(b) Find another equation in x and y and solve it simultaneously with the equation in **part (a)** to find the value of x and the value of y.

$x =$ .....

$y =$ ..... **[5]**

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9 **(a)** Evaluate.

(i) $3^0 + 4^{-1}$

(a)(i) ..... **[2]**

(ii) $16^{\frac{3}{4}}$

(ii) ..... **[2]**

(b) Find $\sqrt{32} + \sqrt{50}$, giving your answer in the form $k\sqrt{2}$.

(b) ..... **[2]**

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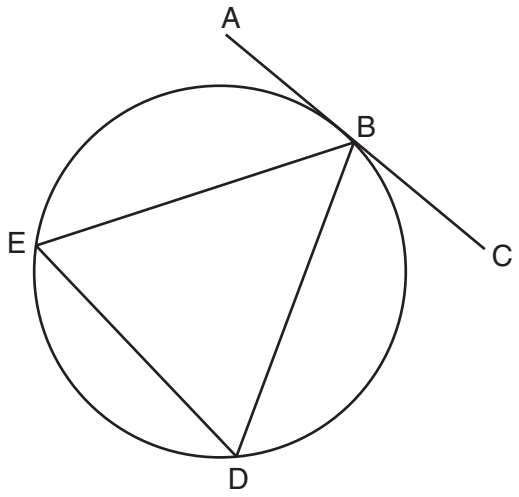
10 (a) ABC is a tangent to the circle at B.
D and E are points on the circle.



Not to scale

Given that angle CBD is 81°, calculate the size of the **reflex** angle BED.
Give a geometrical reason for each step of your work. **[3]**

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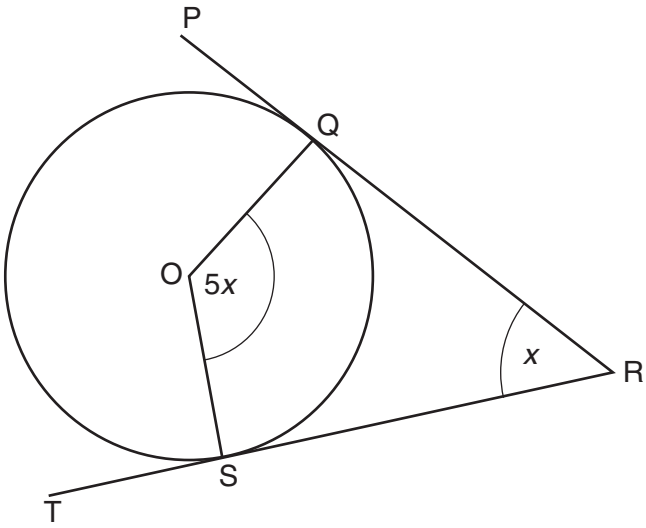
(b) PQR and TSR are tangents to the circle at Q and S.
O is the centre of the circle.



Use algebra to prove that $x = 30°$.
Give a geometrical reason for each step of your work. **[4]**

END OF QUESTION PAPER

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