PURE MATHEMATICS 1 **PAPER 1v4** **AUTUMN 2019**

TIME ALLOWED: 1 hour

ANSWER ALL THE QUESTIONS

TOTAL MARKS = 40

Materials provided – answer booklet

INSTRUCTIONS: Write **only** in the answer booklet.

You **must** show your method.

Formulae

Algebra

Quadratic Equation:

The roots of the equation $ax^2 + bx + c = 0$ where $a \neq 0$ are given by

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

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc\cos A$$

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

Questions

1 (You must show your method.)

(a) Simplify $\sqrt{12}$ [1 mark]

(b) Rationalise and simplify $\frac{1}{3-\sqrt{7}}$ [2 marks]

2 Simplify (a) $x^3 \times x^7$ [1 mark]

(b) $(3t^3)^4$ [1 mark]

Exam continues…

3 Fully factorise

(a) $3x^2 - 2x - 8$ [2 marks]

(b) $3x^2 - 75$ [2 marks]

4 Make d the subject of [2 marks]

$$B = \frac{4\sqrt{d}}{RT}$$

5 Solve the equation [2 marks]

$$\frac{4}{3} = \frac{16}{x + 5}$$

6 Use the quadratic formula to find the roots of [3 marks]

$$6x^2 + 3x - 7 = 0$$

giving your correct to 3 significant figures.

7 Use Pascal's triangle to find the expansion of $(2 - 3x)^4$ [2 marks]

Simplify your answer.

8 Solve the simultaneous equations [3 marks]

$$2x + 7y = 11$$
$$5x + 3y = 13$$

9 (a) Convert 90° to radians giving your answer as a multiple of π. [1 marks]

(b) Convert 1.8 radians into degrees. [1 marks]

10 Find the two angles in the range 0° to 360° whose tangent is -1 [1 marks]

Exam continues…

11 In triangle ABC, AB = 16cm, AC = 18cm and angle A = 35°. Give your answers correct to 3 significant figures.

[3 marks]

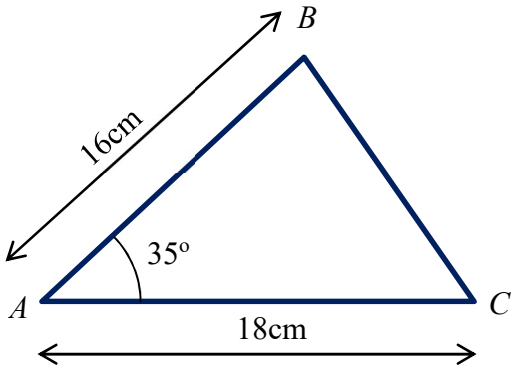
(a) Find the length of BC.

[2 marks]

(b) Find the area of the triangle.

[2 marks]

(c) Find the perpendicular height of B.



12 Differentiate the following with respect to x

(a) $y = \frac{3}{x^4}$ [2 marks]

(b) $y = 6\sqrt[3]{x}$ [2 marks]

13 Determine the co-ordinates of the point on the graph [5 marks]

$$y = 3x^2 + 8x - 1$$

where the gradient is -4

End of Examination