

Year 12

Maths A-Level

Progress Test

Sept 2020

Name: _____

Teacher's Name: _____

Candidates may use any calculator allowed by Pearson regulations.

Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams / sketches / graphs it must be dark (HB or B).
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Advice

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

1. Make x the subject of the following equations

$$\text{a) } \frac{a}{b}(cx - d) = \frac{3a}{b^2}(c - x)$$

(3)

2. Write as a single fraction. Leave your answers in their simplest form.

a) $\frac{2x-2}{x+3} \div (x-1) =$

(1)

b) $\frac{x+1}{\sqrt{x}} - \sqrt{x} =$

(2)

3. Write the following in the form $1 + \frac{a}{x+b}$:

a) $\frac{x+3}{x-1}$

(2)

4. Expand the following

a) $(x - 2x^{-2})^2$

(3)

5. Simplify the following.

a) $\sqrt{9y^2 - 60y + 100}$

(2)

6. Write the following in the form $a(x + b)^2 + c$

a) $2x^2 + 12x - 3$

(3)

7. Factorise and simplify the following

a) $\frac{(x-1)^2 - 3(x-1)}{x^2 - 1}$

(3)

8. Write this expression as a product of two factors

a) $2(x - 2)^5 + 3x(x - 2)^4$

(3)

9. Solve the following simultaneous equations

$$4x^2 + y^2 = 17$$

$$2x + y = 5$$

(5)

10. Rationalise the denominator

$$\frac{28}{3 + \sqrt{2}}$$

(3)

11. Solve the following equations for $-180 \leq x < 180$ to 3 significant figures.

a) $\tan x^\circ = 2$

(3)

12. Sketch the following curve. Show clearly the intersections with the x-axis and y-axis.

a) $y = (x - 3)(1 - x)$

(3)

b) State the vertical line of symmetry.

(1)

13. (a) Write down the value of $16^{\frac{1}{4}}$.

(1)

(b) Simplify $(16x^{12})^{\frac{3}{4}}$

(2)

14. Solve the equation $2^{1-x} = 4^x$.

(3)

15. (a) Factorise completely $x^3 - 6x^2 + 9x$

(3)

(b) Sketch the curve with equation $y = x^3 - 6x^2 + 9x$

(4)

16. Sketch the graph of $y = (x + 2)^3(4 - x)$

(4)

TOTAL SCORE OUT OF 54