Name: _____

Maths Genie Stage 12

Test C

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- **Calculators may be used.**

Information

- 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

1 x is inversely proportional to the square root of y

When $x = 14$, $y = 16$

Find the value of x when $y = 64$

$x =$…….....

(Total for Question 1 is 3 marks)

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2 There are 12 boys and x girls in a choir.
One boy and one girl will be selected to sing a duet.
Taylor says there are 174 different ways of choosing a boy and a girl.

Could Taylor be correct?
You must show your working.

(Total for Question 3 is 2 marks)

3 The function f is defined such that

$$f(x) = 2x^2 - 1$$

(a) Find an expression for $f(x - 2)$

.....

(2)

(b) Hence solve: $f(x - 2) = 0$
Give your answers correct to 3 significant figures.

.....

(3)

(Total for Question 3 is 5 marks)

4 Factorise $6x^2 - 7x - 5$

…….....…….....

(Total for Question 4 is 2 marks)

5 Cylinder A and cylinder B are mathematically similar.
The total surface area of cylinder A is 100 cm^2 and the total surface area of cylinder B is 144 cm^2.

Cylinder A has a height of 7 cm

Calculate the height of cylinder B.

..... cm

(Total for Question 5 is 3 marks)

6 On Monday, a company's share price increased by 15%
On Tuesday, the company's share price decreased by 10%

Katie says: "The share price has now increased by 5%".

Is Katie correct?
You must show your working.

(Total for Question 6 is 2 marks)

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7 Here are the first 5 terms of a quadratic sequence.

1 8 21 40 65

Find an expression, in terms of n, for the nth term of this sequence.

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(Total for Question 7 is 4 marks)

8 (a) Show that the equation $5x^3 - x^2 - 8 = 0$ has a solution between $x = 1$ and $x = 2$.

(2)

(b) Show that the equation $5x^3 - x^2 - 8 = 0$ can be rearranged to give: $x = \sqrt{\dfrac{8}{5x - 1}}$

(1)

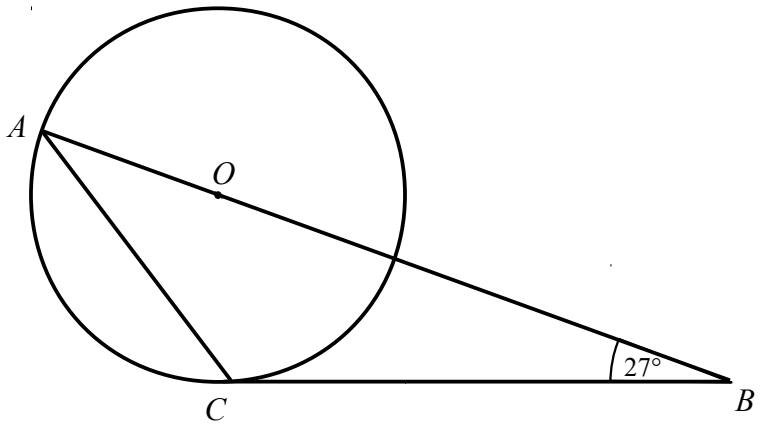
(c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt{\dfrac{8}{5x_n - 1}}$ twice to find an estimate for the solution to $5x^3 - x^2 - 8 = 0$

.....

(2)

(Total for Question 8 is 5 marks)

9



A and *C* are points on the circumference of a circle, centre *O*.
BC is a tangent to the circle.

Angle *ABC* = 27°

Find the size of angle *CAB*.
You must show all your working.

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(Total for Question 9 is 4 marks)