

Name: _____

Maths Genie Stage 12

Test D

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.*

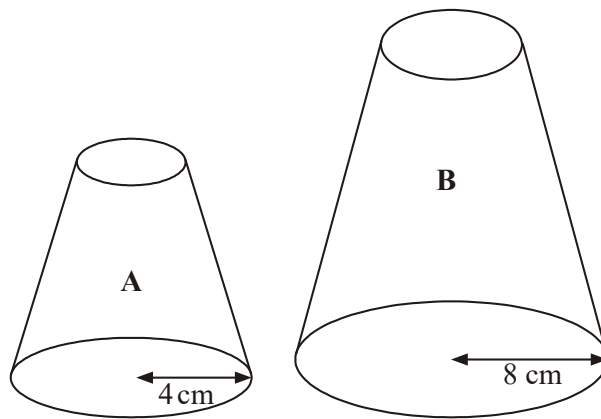
Advice

- 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 There are 14 boys and 16 girls in a class.
One boy and one girl will be selected to represent the class on the student council.
Work out the total number of ways of choosing a boy and a girl.

.....
(Total for Question 1 is 2 marks)

2



Two solid shapes, A and B, are mathematically similar.

The base of shape A is a circle with radius 4 cm.

The base of shape B is a circle with radius 8 cm.

The volume of shape A is 140 cm^3 .

Work out the volume of shape B.

..... cm^3
(Total for Question 2 is 3 marks)

- 3 Alex invests some money for 4 years in a savings account.
She gets 2.6% per annum compound interest.

Alex has £4709.54 at the end of 4 years, work how much she invested.

£.....

(Total for Question 3 is 3 marks)

- 4 x is directly proportional to the cube of y

When $x = 64$, $y = 0.5$

Find the value of y when $x = 1728$

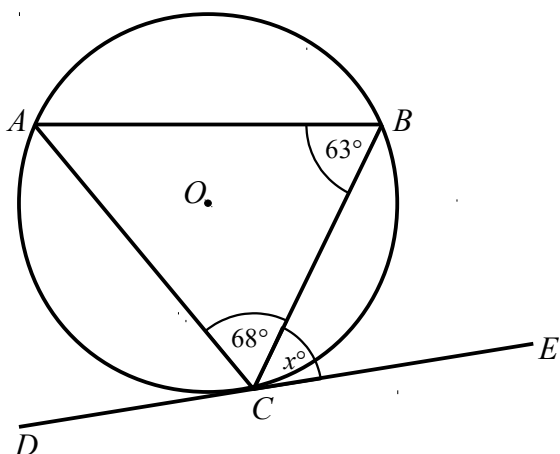
$y = \dots$

(Total for Question 4 is 3 marks)

5 Factorise fully $5x^2 - 80$

.....
(Total for Question 5 is 2 marks)

6



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

Angle $ABC = 63^\circ$

Angle $ACB = 68^\circ$

Angle $BCE = x^\circ$

Find the value of x .

Give reasons for each stage of your working.

.....
(Total for Question 6 is 3 marks)

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

1 4 8 13 19

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

.....
(Total for Question 7 is 4 marks)

8 Given that $f(x) = 3x + 1$ and $g(x) = x^2 - 6$

(a) Work out an expression for $gf(x)$

.....
(2)

(b) Solve $gf(x) = 0$
Give your answers correct to 3 significant figures.

.....
(3)

(Total for Question 8 is 5 marks)

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

(2)

(b) Show that the equation $x^3 + 5x = 2$ can be rearranged to give: $x = \frac{2}{5} - \frac{x^3}{5}$

(1)

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

.....
(2)

(Total for Question 9 is 5 marks)
