

ENTRANCE TEST
LYCEUM
MATHEMATICS
July 2016

Time allowed: One hour 15 minutes

ANSWER ALL QUESTIONS IN DETAIL, SHOWING ALL YOUR WORK ON THE SAME PAGE AS THE QUESTION. ANSWERS WITH NO EVIDENCE OF CALCULATIONS WILL NOT SCORE ANY MARKS.

NO BOOKS, NOTES, CALCULATORS OR ANY SORT OF ASSISTING MATERIAL ARE ALLOWED.

Question 1

Solve the simultaneous equations:

$$y - 2x = 1$$

$$y^2 = 2x^2 + x$$

Answer.....

Total for page 5 marks

Question 2

Write the number

a) 2.(816) in the simplest form of $\frac{x}{y}$ where x and y are integers and $y \neq 0$

Answer.....

b) Simplify the expression $\frac{3\sqrt{2}+2\sqrt{3}}{3\sqrt{2}-2\sqrt{3}}$

Write your answer in its simplest form of $a + b\sqrt{c}$

Answer.....

Total for page 5 marks

Question 3

For the geometric series

$$a + ar + ar^2 + \dots$$

the sum of the first two terms is 24 and the sum to infinity is 27.

Show that $r = \pm \frac{1}{3}$

Answer.....

Total for page 5 marks

Question 4

Given that $f(x) = 2x^3 + 3x^2 - 5x - 6$ and $(x+1)$ is a factor, factorise fully the polynomial $f(x)$.

State the set of values of x for which $f(x) \leq 0$

Answer.....

Total for page 5 marks

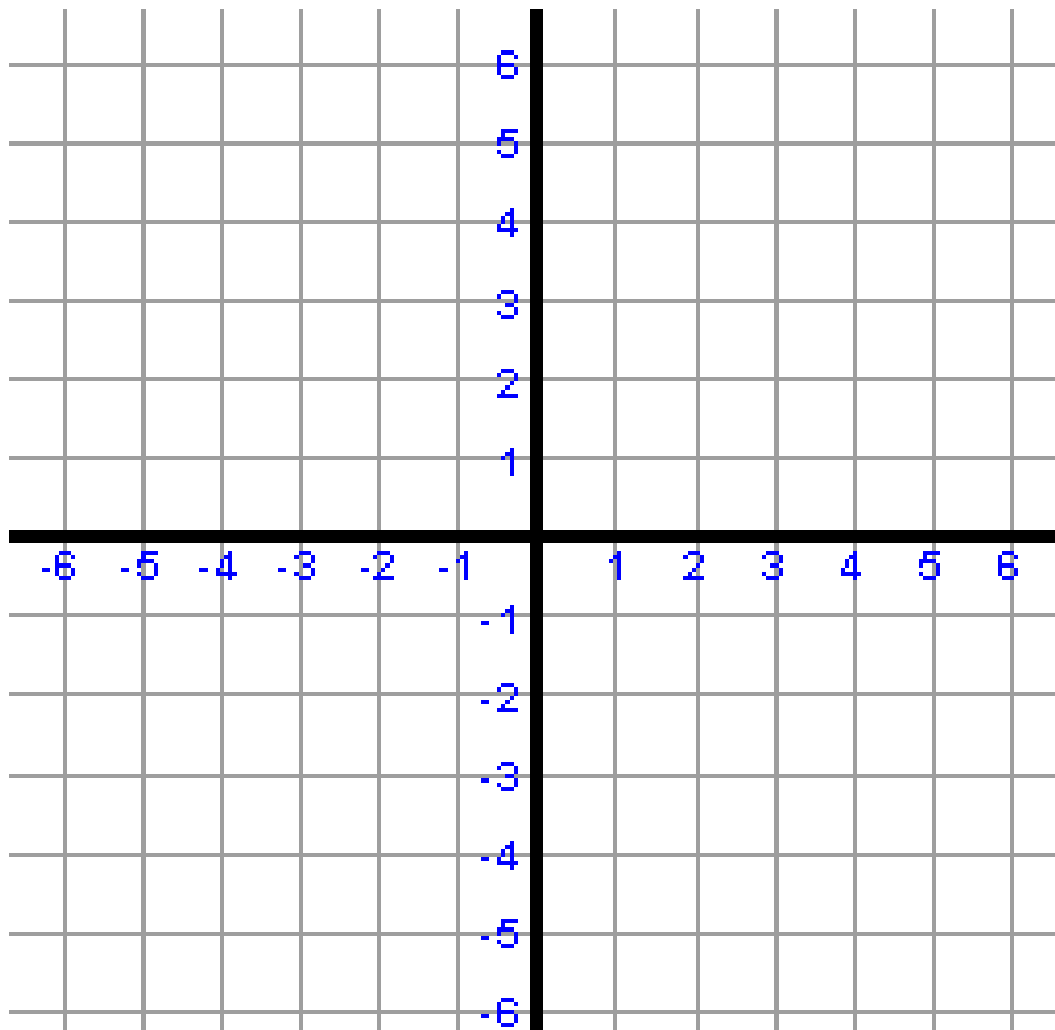
Question 5

On the grid below

a) draw the circle with equation $x^2 + y^2 = 25$

b) draw the line with equation $y = 2x + 1$

Estimate the points of intersection to one decimal place.



Estimated points of intersection.....

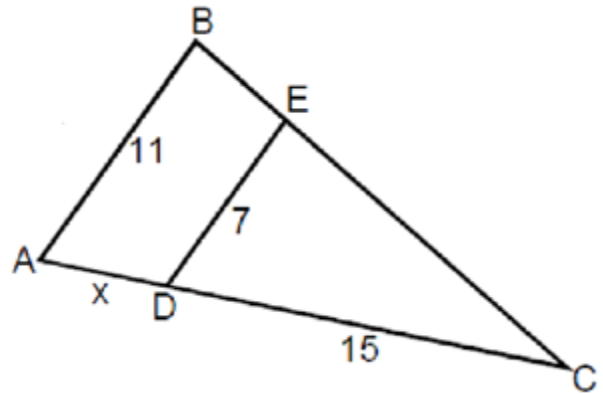
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Total for page 5 marks

Question 6

In the diagram below AB is parallel to DE.

- a) Prove that triangle ABC is similar to triangle DEC.



Answer.....

- b) Work out the value of x in the diagram below.

All values are in cms.

Give your answer to 2 decimal places.

Answer.....

Total for page 5 marks

Question 7

A water tank has a radius of 80cm and a length of 200cm.

It is half filled with water.

120 litres per day is used to water a garden.

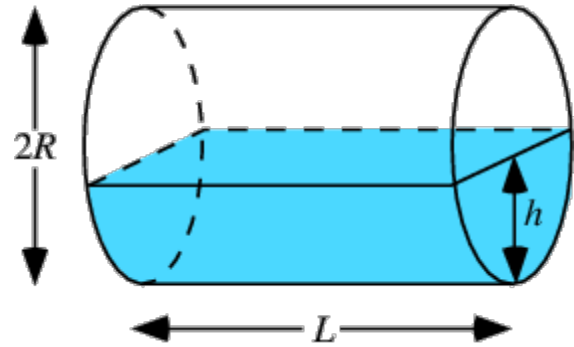
For how many days can the garden be watered from the tank?

Use 3.14 for the value of π

Give your answer to the nearest whole day.

The volume of cylinder = $\pi r^2 l$

$1\text{cm}^3 = 1$ millilitre



Answer.....

Total for page 5 marks

Question 8

A bathroom floor is being tiled.

One size of square tile will cover the floor with 200 tiles.

Another square tile, with sides 2 cm less, will use 250 tiles to cover the same area.

Find the size of the larger tiles to the nearest cm.

Answer.....

Total for page 5 marks

END OF TEST

TOTAL FOR TEST 40 MARKS

USE THIS PAGE FOR DRAFTS