

KULLEGĠ SAN BENEDITTU
Boys Secondary School, Kirkop



HALF-YEARLY EXAMINATIONS – FEBRUARY 2014

FORM 4

MATHEMATICS Scheme A

TIME: 20 mins

Non Calculator Paper

Mark

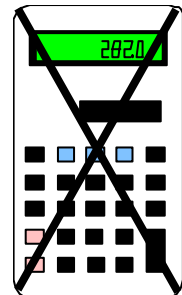
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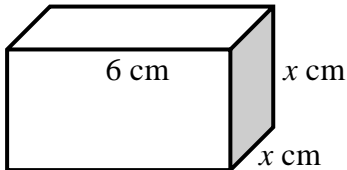
NAME AND SURNAME: _____ **CLASS:** _____

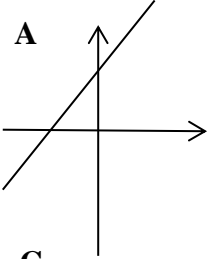
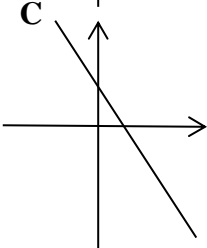
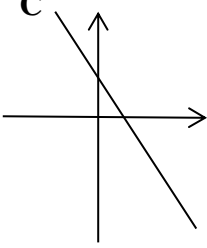
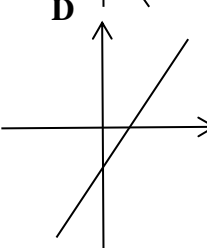
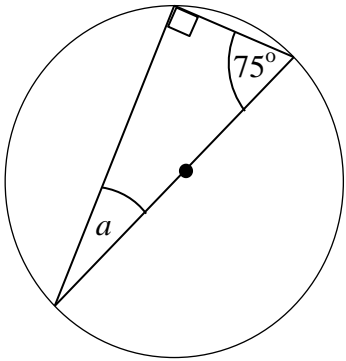
INSTRUCTIONS TO CANDIDATES:

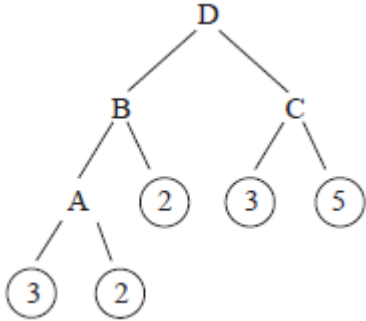
Read all the questions carefully before you start answering.

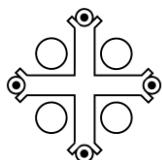
- Answer all questions.
- This paper carries 20 marks.
- **Calculators, protractors** and other mathematical instruments are **NOT ALLOWED**.
- On your desk you should have nothing except for **pen, pencil, ruler** and the **examination paper**.
- You are not required to show your working. However, space for working is provided if you need it.



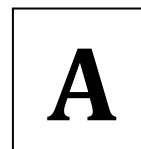
No.	Question	Space for working, if required.
1	If $x = \frac{ab^2}{c}$, find x when $a = -1$, $b = -2$ and $c = 2$. _____	
2	Express $\left(\frac{2}{3}\right)^{-2}$ as an improper fraction . _____	
3	Given that 2^{10} is approximately equal to 1000, Then, 1 000 000 is approximately equal to 2^n . What is the value of n ? $n =$ _____	
4	Given that $\frac{15.3 \times 12.4}{5.1 \times 31} = 1.2$ Find the value of : $\frac{1.53 \times 1.24}{5.1 \times 0.31}$ _____	
5	The cost of a ticket is reduced from €25 to €20. What is the percentage decrease? _____	
6	Evaluate: $(6.8)^2 - (3.2)^2$ _____	
7	Fill in the missing command needed to draw an equilateral triangle of sides 30 turtle steps. PD REPEAT 3[FD 30 RT _____]	
8	 <p>The volume of this cuboid is 54 cm^3. Find the value of x. _____</p>	

9	<p>Which of these graphs is the best sketch of the line with equation $y = -3x + 2$?</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A</p>  </div> <div style="text-align: center;"> <p>B</p>  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>C</p>  </div> <div style="text-align: center;"> <p>D</p>  </div> </div> <p style="text-align: right; margin-top: 20px;">_____</p>	
10	<p>Convert:</p> <p style="text-align: center;">$2.5 \text{ m}^2 \text{ to cm}^2$</p> <p style="text-align: right;">_____ cm^2</p>	
11	<p>Simplify:</p> <p style="text-align: center;">$\sqrt{\frac{49x^3y^4}{x}}$</p> <p style="text-align: right;">_____</p>	
12	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Find the value of a.</p> <p style="text-align: right;">_____ °</p> </div> </div>	
13	<p>Make a subject of the formula.</p> <p style="text-align: center;">$v = u + at$</p> <p style="text-align: right;">$a =$ _____</p>	
14	<p>Give all the solutions to:</p> <p style="text-align: center;">$(x - 2)(x + 3) = 0$</p> <p style="text-align: right;">$x =$ _____</p>	

15	Factorise completely : $2x^2 - 8$ _____	
16	Find the value of: $\frac{2 \times 10^3}{4 \times 10^5}$, giving your answer in standard form . _____	
17	Write the positive solution to: $(x + 2)^2 = 25$ $x =$ _____	
18	Find the value of D in this factor tree diagram.  _____	
19	$3^3 + 3^3 + 3^3$ is equivalent to: (A) 3^4 (B) 9^3 (C) 3^9 (D) 27^3 _____	
20	Kimberly tried to solve the quadratic equation: $x^2 + 5x = 6$ These are the steps she took. In which of the steps did she make a mistake? Step 1: $x^2 + 5x - 6 = 0$ Step 2: $(x + 3)(x + 2) = 0$ Step 3: Either $(x + 3) = 0$ or $(x + 2) = 0$ Step 4: $x = -3$ or $x = -2$ _____	



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HALF-YEARLY EXAMINATIONS – FEBRUARY 2014

FORM 4

MATHEMATICS Scheme A

TIME: 1hr 40mins

Main Paper

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Main	NC	Global Mark
Mark																	

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NAME AND SURNAME: _____ **CLASS:** _____

INSTRUCTIONS TO CANDIDATES:

Read all the questions carefully before you start answering.

- Answer all questions.
- This paper carries 80 marks.
- Calculators and mathematical instruments are allowed but all necessary working must be shown.

1. Simplify the following giving your answer as a single power (in the form of a^n):

a) $\frac{3^6}{3}$

b) $\frac{(9^5)^2}{9^0}$

c) $\frac{2^6}{8}$

(4 marks)

2. The mean distance of the earth from the sun is **149.6 million** kilometres.

a) Write the number 149.6 million in **standard form**.

_____ km

The earth travels a distance of D km in one day.

The value of D is given by the formula:

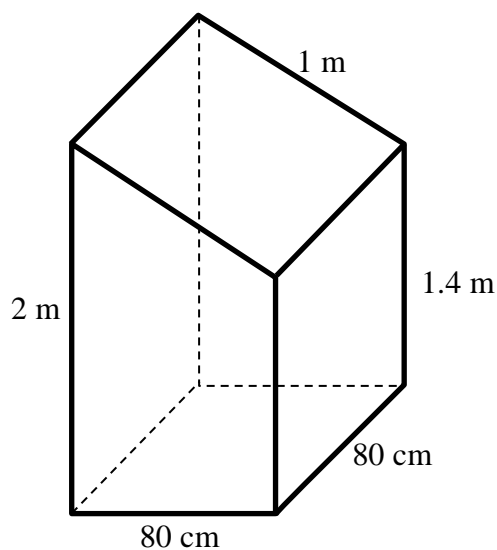
$$D = \frac{2\pi \times \text{distance of earth from sun}}{365}$$

b) Calculate the value of D giving your answer in **standard form** correct to **3 significant figures**.

_____ km

(4 marks)

3. The diagram shows a sketch of a monument, which is to be covered in marble. Calculate the area, in m^2 , of marble required to cover all the sides and slanting top of the monument.



_____ m^2

(4 marks)

4. a) By selling a particular set of books for €408, a bookseller makes a loss of 4%. Find the cost price of the books.

€ _____

- b) The population of the world was estimated to be 4.5×10^9 at the beginning of 1990. If the population increases by 3% each year, find the population

i) at the beginning of 1991.

- ii) at the beginning of the year 2000, correct to **1 significant figure** and in **standard form**.

(7 marks)

5. Express as simply as possible:

a) $\frac{4x^2 \times 6x^5}{12x^3} =$

b) $\frac{a^4 \times (a^2)^2}{a^8} =$

(5 marks)

6. Jim borrows €2000 to furnish a new flat. He has to pay interest at the rate of 15% per annum.

(a) Find the amount of interest to be paid at the end of the first year.

€ _____

He actually pays €500 back at the end of each year as a repayment. Jim uses a spreadsheet to see how much money he still owes the bank at the end of each year.

	A	B	C	D	E
1	beginning of year 1	balance	2000		
2					
3		balance + interest	2300		
4		repayment		500	
5	end of year 1	amount due	1800		
6					
7		balance + interest	2070		
8		repayment		500	
9	end of year 2	amount due	1570		
10					
11		balance + interest			
12		repayment			
13	end of year 3	amount due			
14					
15		balance + interest			
16		repayment			
17	end of year 4	amount due			
18					

(b) What formula does Jim input in cell C11?

= _____

(c) Work out how much does he still owe at the end of the fourth year.

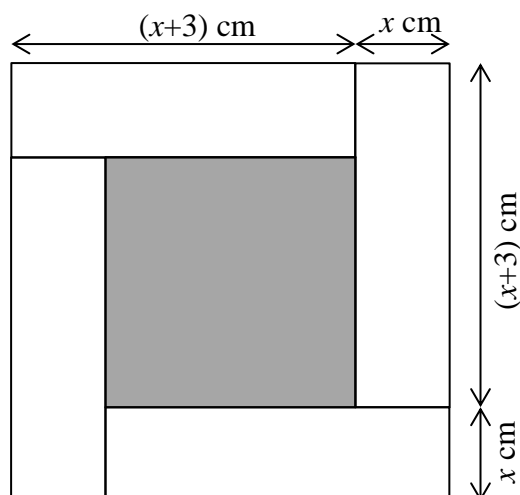
€ _____

(6 marks)

7. Four identical rectangular tiles are placed around a square tile as shown in the following diagram.

- a) i) Form an expression for the area of one rectangular tile.

- ii) Hence write an expression for the total area of the **four** rectangular tiles.



- b) Expand $(2x + 3)^2$

- c) **Hence or otherwise**, find the area of the shaded square in the middle.

_____ cm^2

(5 marks)

8. Express as a single fraction:

$$\frac{1}{3x} - \frac{2}{5y}$$

(2 marks)

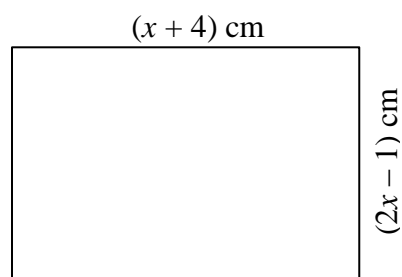
9. a) Solve: $2x^2 - 5x + 3 = 0$

$x =$ _____

b) The rectangle shown has a **length** of $(x + 4)$ cm and a **width** of $(2x - 1)$ cm.

Given that its area is 20 cm^2 ,

(i) show that $2x^2 + 7x - 24 = 0$

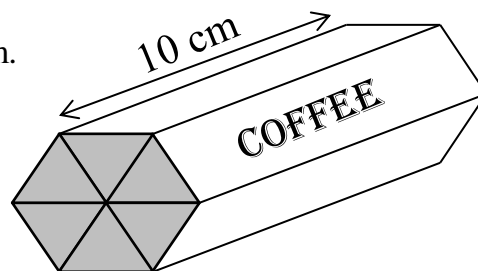


(ii) Solve the equation to find the **length** of the rectangle to **2 decimal places**.

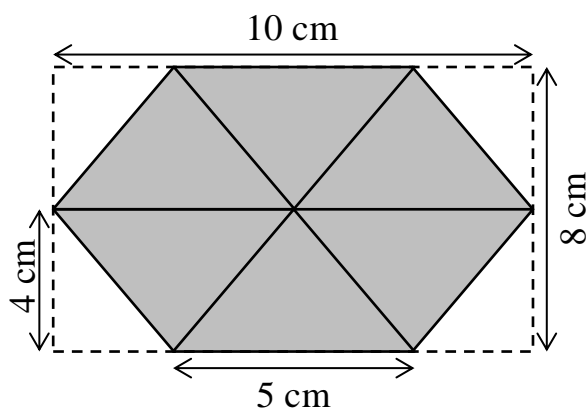
_____ cm

(10 marks)

10. A coffee tin is in the shape of a hexagonal prism.
Its **length** is 10 cm long.



One end of the tin is shown below. Each of the six triangles in the hexagon has the same dimensions.



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- a) Calculate the total area of the hexagonal cross-section.

_____ cm^2

Coffee fills 80% of the tin.
The mass of 1 cm^3 of coffee is 0.5 g .

- b) Find the weight of coffee in the tin. Show all your working.

_____ g

- c) The same tin of coffee is sold at the price of €2.19. How much would you expect to pay for 100 g of this brand of coffee?

€ _____

(8 marks)

11. Students conduct an experiment to find g , the acceleration due to gravity. They measure the time, T seconds, for one complete swing of the pendulum of length L metres.

The formula used to find g is:

$$g = \frac{4\pi^2 L}{T^2}$$

- a) Find g when $L = 0.3924$ and $T = 1.26$, correct to **3 significant figures**.
(use the π button on your calculator)

$$g = \underline{\hspace{2cm}}$$

- b) Rearrange the formula to express T in terms of g , π and L .
Simplify your answer as far as possible.

$$T = \underline{\hspace{2cm}}$$

(5 marks)

12. Find the value of n :

a) $5^n = \frac{1}{125}$

b) $2 \times 4^n = 32$

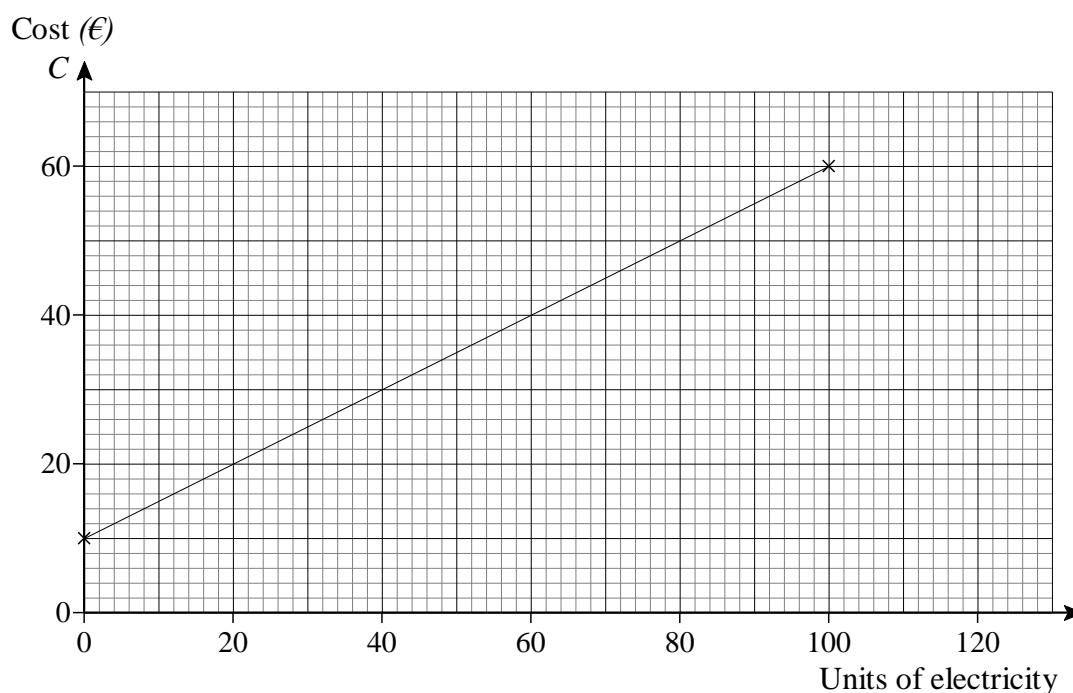
$$n = \underline{\hspace{2cm}}$$

$$n = \underline{\hspace{2cm}}$$

(5 marks)

13. The graph shows the cost C , in Euro, of electricity used by one person.

This cost C is made up from a fixed charge, plus the cost of the number of units of electricity used.



- a) Use the graph to find:

i) The fixed charge

€ _____

ii) The cost, in cents, of one unit of energy

€ _____

The same energy company, decides to eliminate the fixed charge. However, the price of one unit of energy is increased to 70 cents per unit.

- b) By drawing another line (on the same graph) for the new rate, give the point of intersection of the two lines.

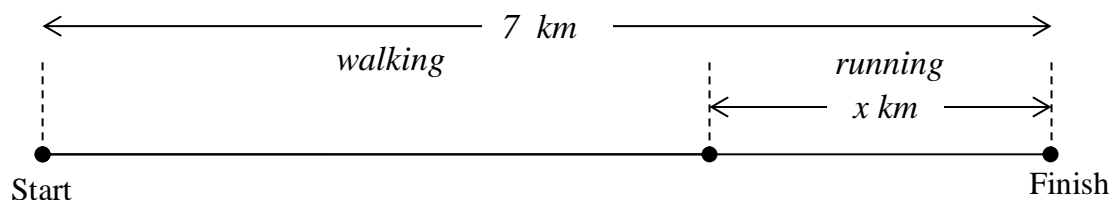
- c) A customer thinks that the second tariff is cheaper. Explain, by making reference to the graphs) why this is not always the case.

(6 marks)

14. Kim went out for a trip on a Sunday afternoon.
She walked the first part of her journey at a **speed** of **6 km/hr** and ran the second part of the journey at **12 km/hr**.

The **total distance** travelled was 7 km.

The diagram below shows the distances covered during the whole trip.



Given that the running distance was x km,

- a) Write an expression in terms of x for the **distance** travelled while **walking**.

- b) Write an expression in terms of x for the **time** taken when **running**.

$$\left(\text{Speed} = \frac{\text{distance}}{\text{time}} \right)$$

- c) Write an expression in terms of x for the **time** taken when **walking**.

If the **total time taken** for the whole journey was 1 hour,

- d) Write down an equation in terms of x .

- e) Hence, **solve** the equation to find the distance covered while running.

$$x = \underline{\hspace{2cm}}$$

(9 marks)