KULLEĠĠ SAN BENEDITTU

Boys Secondary School, Kirkop

Track 3

HALF-YEARLY EXAMINATIONS – FEBRUARY 2014

FORM 3 **MATHEMATICS** **TIME: 1 h 30mins**

Track 3

Main Paper

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

DO NOT WRITE ABOVE THIS LINE

NAME AND SURNAME:_____ CLASS: _____

INSTRUCTIONS TO CANDIDATES:

Read all the questions carefully before you start answering.

- Answer all questions.
- This paper carries 75 marks.
- Calculators and mathematical instruments are allowed but all necessary working must be shown.

1. A sequence is described by the formula: $\mathbf{3}n + \mathbf{2}$. Give the values for:

   a) the first term ($n = 1$);

   Ans. a) _____

   b) the fifth term ($n = 5$).

   Ans. b) _____

   (2 marks)

2. a) The radius of the earth is 6.37×10^6 metres. **Write** this distance as an **ordinary number**.

Ans. a) _____

b) Convert the above answer to **kilometres**.

Ans. b) _____

(2 marks)

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3. a) Make *w* the subject of the formula in $f = \frac{3w-r}{2}$

Ans. a) _____

b) Hence or otherwise, find the **value** of *w* when $f = 10$ and $r = -5$

Ans. b) _____

(5 marks)

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4. A special diet makes you **lose 16%** of your body weight in **3 months**.

a) Pat weighs 90 kg. How much weight does she **lose** if she goes on this special diet for 3 months?

Ans. a) _____ kg

b) Tilly weighs 67.2 kg **after losing** 16% of her body weight with this special diet. Work out how much she weighed at the **start** of her diet.

Ans. b) _____ kg
(5 marks)

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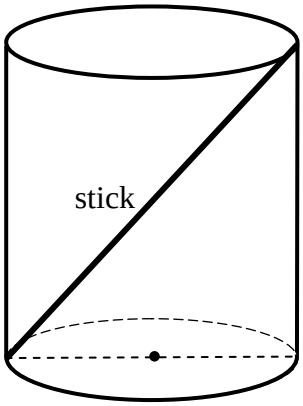
5. A tin is in the form of a cylinder of radius 12 cm and height 22 cm. Leonardo drops a stick in the tin, such that it forms the **diagonal** of the cylinder. A **right angled triangle** also forms.



a) On this diagram write down the measurements for the **height** and **width** of the cylinder. Also mark the **90° angle** of the right angled triangle.

b) Work out the **length** of the stick, correct to the nearest centimetre.

Ans. b) _____ cm
(4 marks)

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6. Inscribe a **regular pentagon** (5 sides) in a circle of radius 4 cm.

(4 marks)

7. In the following equation, use the method of **trial and improvement** and find ***x*** correct to **1 decimal place.**

$$x^3 + 0.5x = 14$$

Ans. x = _____

(4 marks)

8. The following are two brands of sausages.

Steve's Sausages **74% beef**	**Bertie's Bangers** **48g beef out of every 60g**

a) Express both quantities as a **ratio** in the form 1 : *n* . Give *n* correct to **2 decimal places** where necessary.

Ratio of Steve's Sausages	Ratio of Bertie's Bangers
Ans. 1: _____	Ans. 1: _____

b) Rob wants to buy sausages which contain more beef. By comparing your answers in (a), which sausages should he buy? Explain why.

_____

_____

(7 marks)

9. Michael and Tanya both think of the same number.
Michael multiplies the number by 4, and then adds 2.
Tanya adds 4 to the number, and then multiplies the answer by 2.

They both end up with the **same** answer.

a) Let the unknown number be *x* and use this information to form an equation.

Ans. a) _____

b) **Solve** your equation to find the number they both thought of.

Ans. b) *x* = _____

(5 marks)

10. The following spreadsheet is used in investments.

	A	B	C	D
1	**Principal (€)**	**Time (in yrs)**	**Rate (% p.a.)**	**Interest (€)**
2	500	2	4	
3		9	4	108

a) Write down the **formula** to be typed in cell D2 to obtain the interest for the investment in row 2.

Ans. a) _____

b) Write down the **formula** to be typed in cell A3 to obtain the principal for the investment in row 3.

Ans. b) _____

c) Fill in cells D2 and A3 with the correct **values**. Show your working below.

Ans. c) D2 = _____

A3 = _____

(8 marks)

11. *In this question, you may use some or all of the measurements in the diagram.*
Is angle ACD a right angle? Show your working.

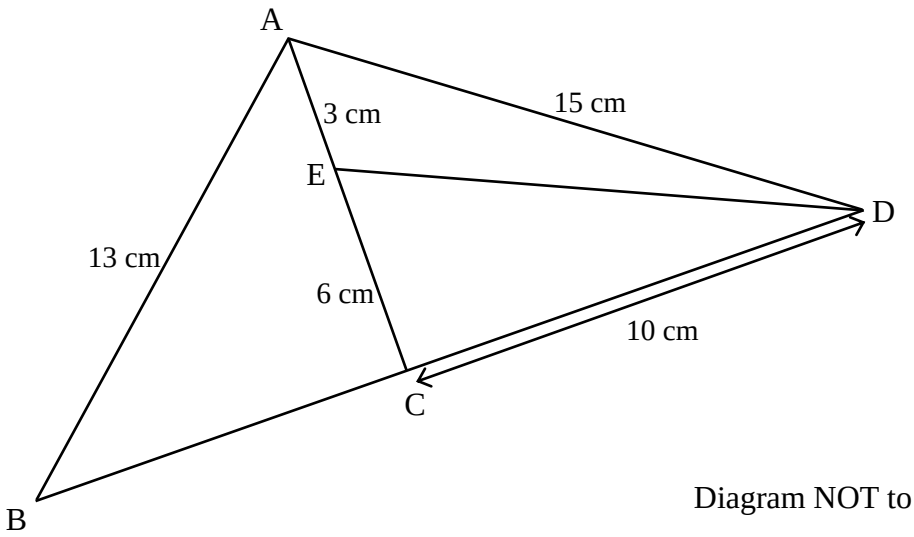


Diagram NOT to scale

Ans. _____

(4 marks)

12. a) Factorise fully: $18a + 30b$

Ans. a) _____

b) Simplify: $\frac{6z+9}{3}$

Ans. b) _____

c) Expand and simplify: $(x + 4)(x - 3)$

Ans. c) _____

d) Evaluate: $\frac{2^5 \times 2^3}{2}$

Ans. d) _____

(9 marks)

13. Terri conducts a survey.
She finds out how many hours of TV students watched last Monday.
The frequency table shows her results.

Number of hours TV	Frequency
0	2
1	7
2	9
3	4
4	3
5	0

a) How many students took part in Terri's survey?

Ans. a) _____ students

b) What is the **mode** number of hours of TV watched?

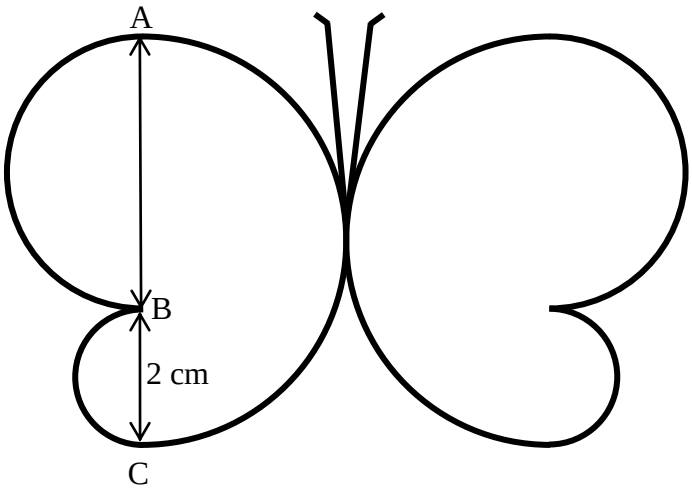
Ans. b) _____ hours

c) Work out the **mean** number of hours of TV watched.

Ans. c) _____ hours

(5 marks)

14. The following is a symmetrical butterfly shape made of thin wire. Each of the antennas is 6 cm long. The wings of the butterfly each consist of 3 semicircles of different sizes, where lengths AB, BC and AC represent their diameters.



a) Find the **length of semicircle** BC. Give your answer in terms of $\boldsymbol{\pi}$.

Ans. a) _____ cm

b) Given that AB = $2\boldsymbol{r}$ cm. Write, in terms of $\boldsymbol{\pi}$, an expression for the length of
   i) semicircle AB;

Ans. b) i) _____ cm

   ii) semicircle AC.

Ans. b) ii) _____ cm

b) Given that the perimeter of one wing of the butterfly is 7π cm, find the value of $\boldsymbol{r}$.

Ans. c) r = _____

d) Find the **cost** involved in buying enough thin wire to make this butterfly if the wire is sold at €1 for every 10 cm required.

Ans. d) €_____

(11 marks)

END OF EXAM