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St Nicholas College Boys Secondary Naxxar
Half-Yearly Examinations February 2015

Track 3

FORM 4 | MATHEMATICS Main Paper | TIME: 1 hr 40 mins

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

DO NOT WRITE ABOVE THIS LINE

Name: _____ 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. a) Express in the form $\boldsymbol{2^n}$:

i) 128

Ans: $2^{\square}$

ii) $\frac{1}{16}$

Ans: $2^{\square}$

(b) Simplify, giving your answer in the form $\boldsymbol{a^n}$:

i) $\frac{(a^5)^2 \times a^{12}}{a^{11}}$

Ans: _____

ii) $\frac{a^6}{a^{-3}} \times \frac{a^0}{a^4}$

Ans: _____

(6 marks)

2. a) Expand and simplify $(x + y)(x - 2y)$

Ans: _____

b) Solve $4^{x-2} = 16$

Ans: x = _____

(4 marks)

3. This spreadsheet shows the prices for a flight to Brussels, offered by different airline companies. It is used to work out currency conversions and compare prices.

	A	B	C	D
1	**Airline**	**Flight Number**	**British Pound (£)**	**Euro (€)**
2			**1**	**1.25**
3	Maltawings	KM1612		110.25
4	Rowenair	RA332	95.90	
5	East-jet	EJ 2212		103.13

a) Fill in the missing **values** in the table. Give your answers correct to **2 decimal places.**

b) The **formula** typed in cell C3 is: **=**_____

c) Which airline is **cheapest**? Ans: _____

(5 marks)

4. Convert:

a) 77 000 cm^3 = _____ litres

b) 6 750 000 cm^3 = _____m^3

c) 0.7m^2 = _____cm^2

(3 marks)

5. Light travels 9.4608×10^{12} km in 1 year.
One year is equivalent to 5.256×10^{5} minutes.

a) Light takes 434 years to travel from the star Polaris to Earth. How many **kilometres** is Polaris away from Earth? Give your answer in **standard form** correct to **3 significant figures**.

Ans: _____ km

b) The distance from earth to the sun is about 150 million kilometres. How long will it take for light to travel this distance? Give your answer **correct to the nearest minute**.

Ans: _____ minutes

(5 marks)

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6. a) Factorise:

i) $16 - r^2$

Ans: _____

ii) $x^2 - 5x - 24$

Ans: _____

b) Make ***n*** subject of the formula:

$6\,(n + m) = 3\,(n - m)$

Ans: ***n*** =_____

(6 marks)

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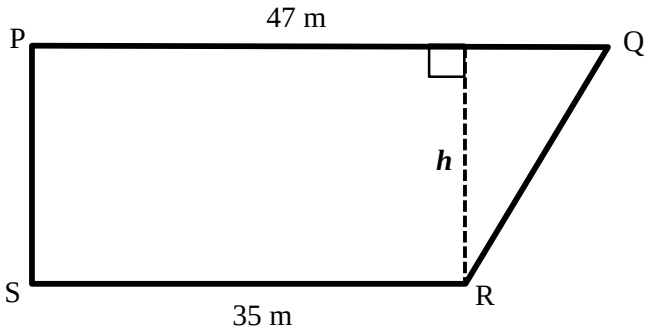
7. The diagram shows a trapezium PQRS. PQ = 47 m and RS = 35 m.

The area of the trapezium is $902\ m^2$

Work out the perpendicular height ***h***.



Ans: _____ m

(3 marks)

8 . a) Kristie buys some office furniture at €1,066.50.
If **VAT** is set at **18.5%,** what is its price before VAT?

Ans: €_____

b) The population of a village increased by 10% in the first year and another 10% in the second year. It then decreased by 10% in the third year. The initial population of the village was 6000.

(i) Work out the population after three years.

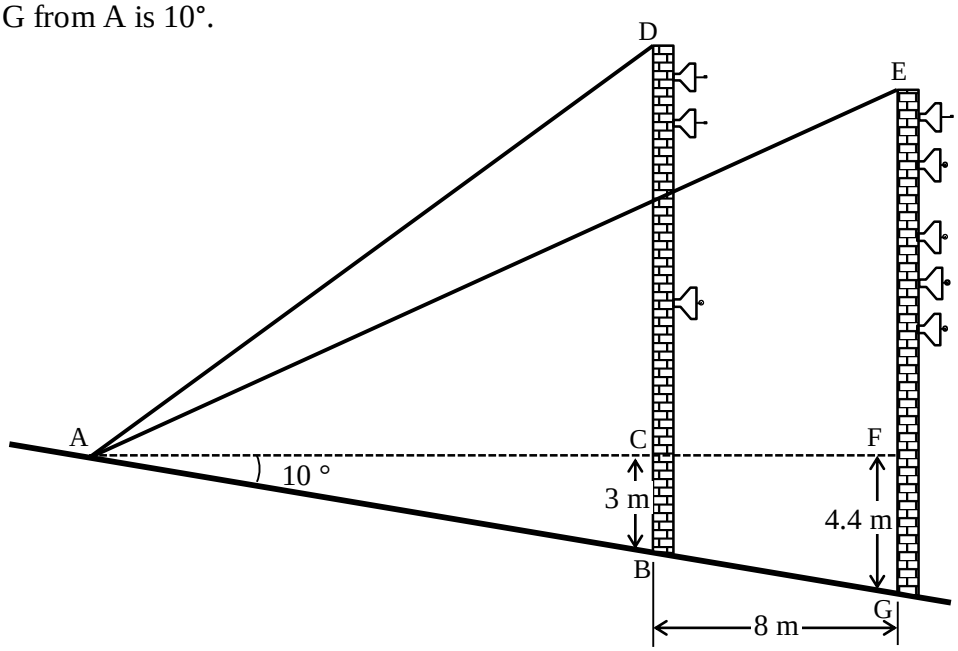
Ans: _____

(ii) Work out the overall percentage increase.

Ans: _____%

(7 marks)

9. Two vertical identical aerial towers BD and GE are each **<u>17 metres high</u>** and are 8 metres apart. The cables DA and EA are used for support. The angle of depression of both B and G from A is 10°.



Work out, correct to 1 decimal place:

a) the distance **AC**;

Ans: _____ m

b) the angle **DAC**;

Ans: _____°

c) the angle **EAF**;

Ans: _____°

d) the length of the longer cable.

Ans: _____ m

(10 marks)

10. Toni invested €48 000 with compound interest. The rate of interest for the first year was 4% while the rate of interest for the second year was 3.5%.

i) Calculate the final **amount** of money at the end of the second year.

Ans: €_____

ii) At the end of the second year €16 667.20 was withdrawn. The rest of the money continued to be invested. The rate of interest for the third and fourth year was r %. The final amount at the end of the fourth year was €36 556.94. Work out the value of r.

Ans: _____%

(7 marks)

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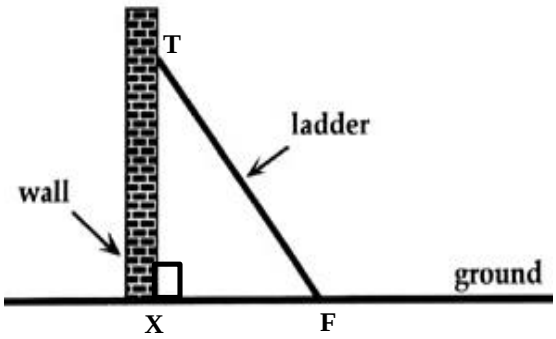
11. TF is a ladder **5 metre** long. It is placed on a horizontal ground, leaning against a vertical wall TX. The distance FX is **1.5 m**.

a) Calculate TX. Give your answer correct to 2 decimal places.



Ans: _____m

b) Can you form a right angled triangle with sides **10 cm, 49.5 cm** and **50.5 cm**? Show your working clearly.

Ans: _____

(5 marks)

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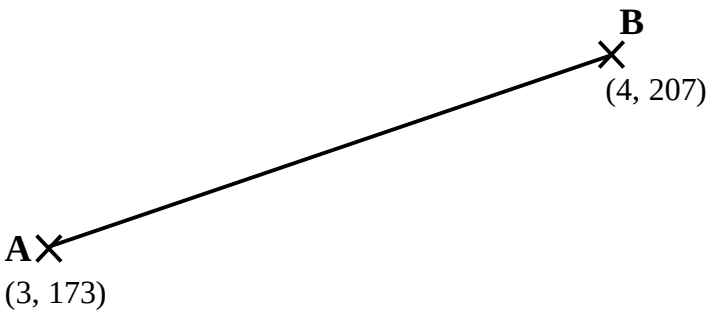
12. Below is part of a linear graph used to work out the cost of hiring cars. This cost is made up of a fixed charge plus a charge per day.

Hiring a car for 3 days costs €173 while hiring it for 4 days costs €207.



a) Work out **the gradient** of the line AB where A is (3, 173) and B is (4, 207).

Ans: _____

b) Work out **the y–intercept** (the fixed charge) of the line graph.

Ans: _____

c) What is the **equation of the line**?

Ans: _____

d) **Use your answer in part c)** to calculate the cost of hiring the car for **1 week**.

Ans: €_____

(7 marks)

13. Ships A and B are out at sea and sail towards a fixed point C. Ship A is due north of B and sails on a bearing of **110°** at an average speed of **56 km per hour**. Ship B sails on a bearing of **080°.**

After **3 hours** both ships arrive at C.

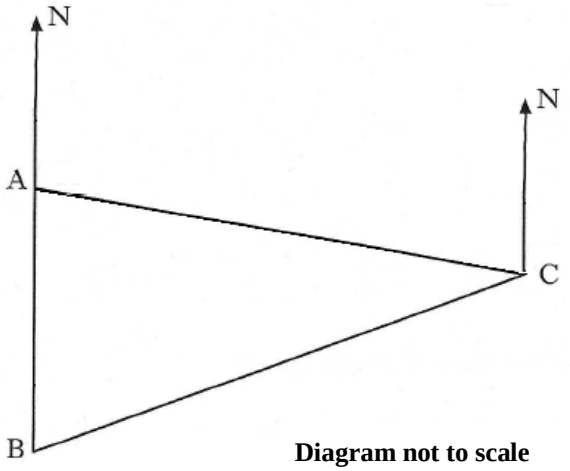


Diagram not to scale

a) On the diagram mark, by writing down its value, the bearing of:

(i) C from A

(ii) C from B

b) Work out the distance **AC**.

Ans: _____km

c) How far **west** is A from C? Give your answer correct to 3 decimal places.

Ans: _____ km

d) Work out the distance **BC**, correct to the nearest km.

Ans: _____ km

e) Which ship has the faster speed? Give a reason for your answer.

_____

_____

(12 marks)

END OF EXAM