JUNIOR LYCEUM ANNUAL EXAMINATIONS 2006
Educational Assessment Unit — Education Division

FORM 4   **MATHEMATICS (Non-Calculator Paper)**   **Time: 20 minutes**
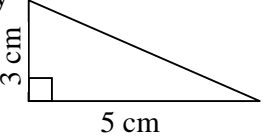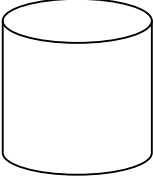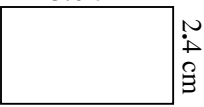
Name: _____   **Class:** _____

Instructions to Candidates

- **Answer all questions. There are 20 questions to answer.**

- **Each question carries 1 mark.**

- **On your desk you should have nothing except for a pen, a pencil and the examination paper.**

- **To answer questions involving numerical calculations you are advised to choose and use the more efficient techniques (mental or paper-and-pencil).**

- **You are not required to show your working. However space for working is provided if you need it.**

No.	Question	Space for Working
1	If $\dfrac{8}{9} = 0.888...$, what is the value of $\dfrac{8}{90}$ correct to **3 decimal places**? **Answer:** _____	
2	A jar of marmalade holds ½ kg of jam. How many jars of marmalade can be filled from 25 kg of jam? **Answer:** _____	
3	Fill in >, < or =. $\mathbf{8^{2/3}}$ _____ **4**	
4	Lm1000 are invested at 10% simple interest. After how many years will the interest amount to Lm500? **Answer:** _____	
5	The **hypotenuse** is approximately **A**. 8 cm **B**. 7 cm **C**. 6 cm **D**. 5 cm 3 cm / 5 cm **Answer:** _____	
6	A girl was asked to multiply a number by 5. Instead she divided by 5 and got an answer of 4. What was the correct answer? **Answer:** _____	
7	How many **5-cent coins** make up Lm8.20? **Answer:** _____	

No.	Question	Space for Working
8	A boy bought a number of copybooks at 24 cents each. He received 20 cents change from Lm5. How many copybooks did he buy? **Answer:** _____	
9	**Decrease** Lm5 by 20%. **Answer:** _____	
10	The volume of the cylinder is 36π cm^3. The area of the base is 9π cm^2. Work out the height of the cylinder. **Answer:** _____	
11	A right-angled triangle is inscribed in a circle. The length of the hypotenuse is 10 cm. Work out the length of the **radius** of the circle. **Answer:** _____	
12	Work out $\sqrt{2 \times \dfrac{1}{8}}$ **Answer:** _____	
13	Which of the following is **not equal** to ½? **A**. 0.5 **B**. 2^{-1} **C**. 5×10^{-1} **D**. 20% **Answer:** _____	

No.	Question	Space for Working
14	Given that $24 \times 36 = 864$, work out the area of this rectangle. 3.6 cm, 2.4 cm **Answer:** _____	
15	Work out the **Highest Common Factor** (HCF) of 18 and 24. **Answer:** _____	
16	If $b = 3 \times 10^{-2}$, work out the value of b^2 giving your answer in **standard form**. **Answer:** _____	
17	The following are the probabilities of certain events happening. There is an error in one of them. Which one is it? **A**. 2 **B**. 1 **C**. ½ **D**. 0 **Answer:** _____	
18	Find the value of $2x^2$ when $x = -3$. **Answer:** _____	
19	Given that 5 miles is approximately equal to 8 km, change 400 km to miles. **Answer:** _____	
20	6 workers take 12 hours to complete a certain job. How long would it take 8 workers to complete the job? **Answer:** _____	

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FORM 4 **MATHEMATICS (MAIN)** **TIME: 1h 40min**

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

Name: _____ **Class: _____**

> **Calculators are allowed but the necessary working must be shown.**
> **Answer all questions.**

1. **Use your calculator** to work out $\sqrt[5]{100}$, giving your answer correct to **2 decimal places**.

    Answer: _____

    (2 marks)

2. Write down the value of *x*.

    (i) $\left(\dfrac{1}{2}\right)^x = 1$ (ii) $x^{-3} = \dfrac{1}{8}$ (iii) $16^x = 4$

    Answer: (i) *x* = _____ (ii) *x* = _____ (iii) *x* = _____

    (3 marks)

3. **Simplify**: $\dfrac{3}{x-4} - \dfrac{1}{x-1}$

    Answer: _____

    (4 marks)

4. (a) Given that $a - b = x$ and $a + b = \dfrac{1}{x}$, what is the value of $a^2 - b^2$?

Answer:_____

(b) **Factorise**: $2x^2 + 5x + 3 =$ _____

(4 marks)

5. A salesperson is using the spreadsheet below to change US dollar, UK sterling and Euro into Maltese Liri.

	A	B	C	D	
1		Exchange Rate	Quantity	Maltese Liri	
2	US Dollar	2.8185	120	42.58	
3	UK Sterling	1.598	80		
4	Euro	2.3294	450		
5					

(i) What **formula** did the salesperson write in **cell D2**?
(ii) What **amount** did the salesperson get in **cell D3**?
(iii) The salesperson changed the amount in cell C4 and got Lm98**.**74 in cell D4. What **amount** did he input in **cell C4**?

Answer: (i) _____ (ii) _____ (iii) _____

(5 marks)

6. Lm5000 is invested at 4**.**5% compound interest.

(i) Use the formula $A = P\left(1 + \dfrac{r}{100}\right)^n$ to work out the **interest** after 5 years, correct to the nearest Lm.

(ii) After how many years will the **amount** of the investment **first exceed** Lm7000?

Answer: (i) _____ (ii) _____

(5 marks)

7. (a) Describe the transformation that maps triangle **T to T1**.

(b) Describe the transformation that maps triangle **T1 to T2**.

(c) Triangle T2 is enlarged by a scale factor of 2 with (−4, 0) as the centre of enlargement. **Draw the image of T2** under this transformation.
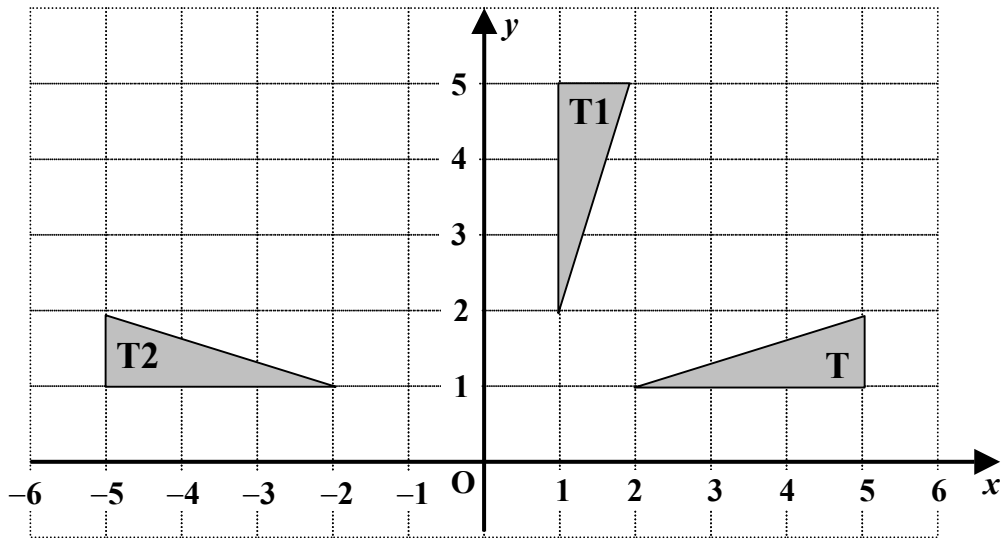


(a) _____

(b) _____

(6 marks)

8. The Shot Put area on an athletics ground is a sector of a circle. It is marked out in 5-metre intervals. Giving your answers correct to 3 significant figures, calculate:

(i) the **length** of the '5-metre' arc, AB.

(ii) the **area** of the sector OCD.

(iii) the **size** of ∠DOC if the area of the sector OCD is 100 m^2.
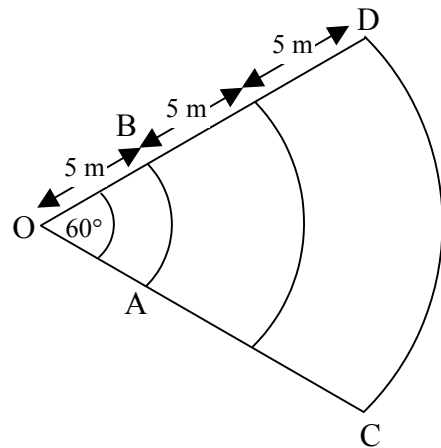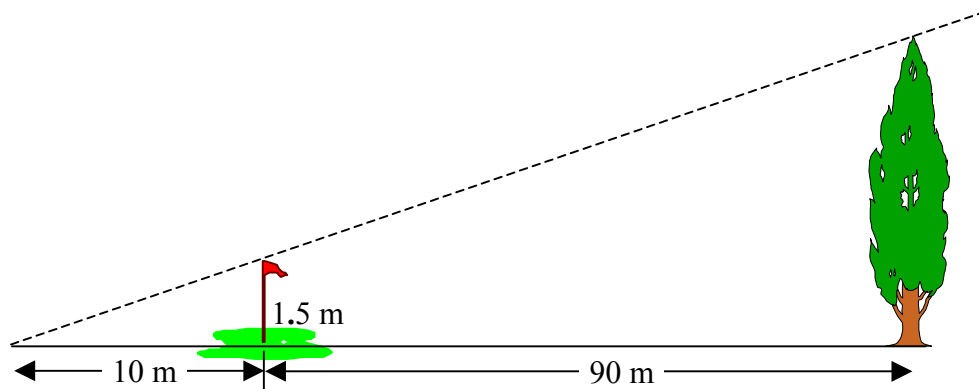

Answer: (i) _____ (ii) _____ (iii) _____

(6 marks)

9. (a) If AB:AD = 3:2 and the area of triangle ADE = 8 cm^2, work out the **area of triangle ABC**.
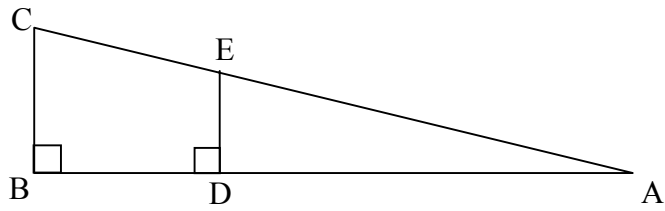
Answer: _____

(b)   The shadow of a tree is 100 metres long and the shadow of a golf flag is 10 metres long. The two shadows coincide, as shown below. What is the **height of the tree**?
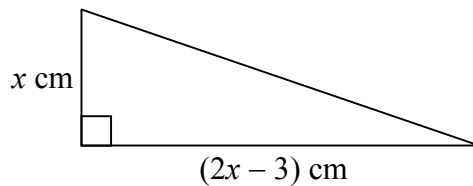

1.5 m

10 m

90 m

Answer: _____

(6 marks)

10. (a) Use the formula $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to **solve the equation** $2x^2 + 6x = 1$.

Give your answers correct to 3 significant figures.
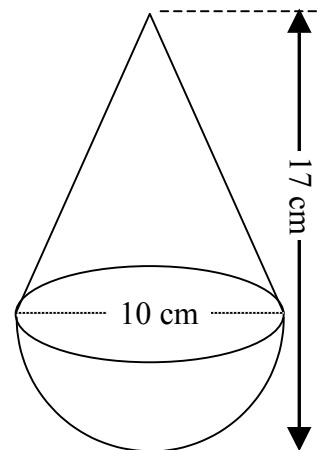
Answer: _____

(b) The area of this triangle is 27 cm^2.
   (i) Form an equation in x.
   (ii) Solve the equation to find the value of x.

x cm

$(2x - 3)$ cm

Answer: _____

(7 marks)

11. A solid is formed from a cone on top of a hemisphere as shown in the diagram. Work out, correct to 3 significant figures:
   (i) the **slanting height** of the cone,
   (ii) the **total surface area** of the solid.
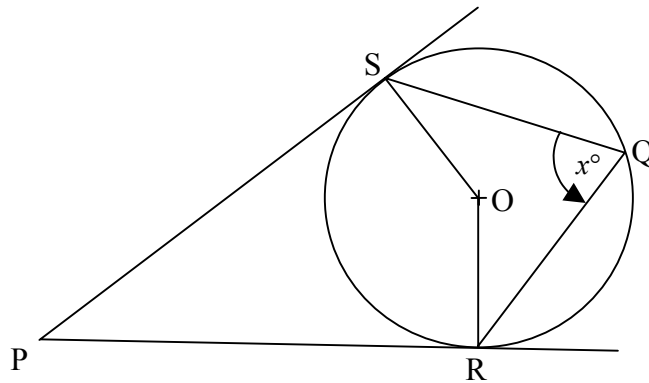   (Surface area of sphere = $4\pi r^2$
   Curved surface area of cone = πrl)

17 cm

10 cm

Answer: (i) _____ (ii) _____

(7 marks)

12. (a) PQ is a chord of a circle with centre O.
OM is drawn perpendicular from O to PQ.
**Prove that M is the midpoint of PQ**.
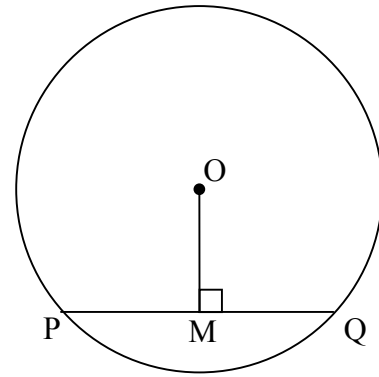
(b) PS and PR are tangents to the circle with centre O. ∠SQR = x°.
(i) Write ∠SOR and ∠SPR in terms of x.
(ii) If ∠SPR = 62°, work out the value of x.

Answer: (i) ∠SOR = _____ ∠SPR = _____ (ii) x = _____

(8 marks)

13. James is taking a test consisting of two papers. The probability that he passes Paper I is 0.7. If he passes Paper I the probability that he is successful in Paper II is 0.6. If he fails Paper I the probability that he is successful in Paper II is 0.3.
(i) **Complete** the tree diagram below.

Paper I   Paper II

fail

fail   0.3

pass

fail

0.7

pass   0.6
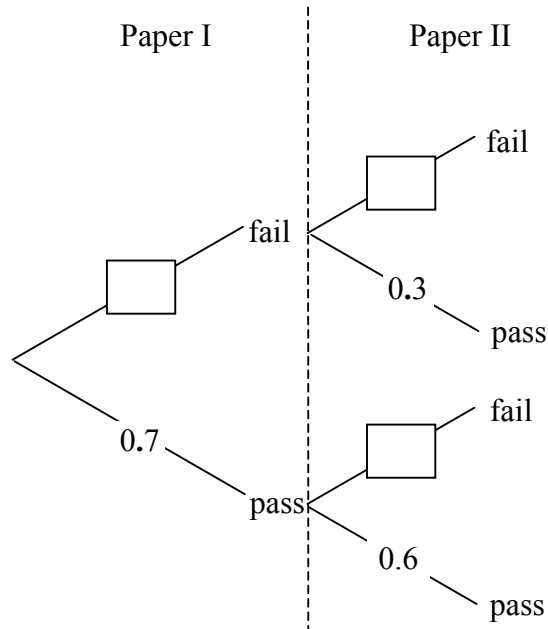
pass

(ii) Use the probability tree to work out the probability that James
   (a) will pass **both** papers,
   (b) will pass **at least** one paper.
(iii) If James fails in only one paper he is allowed to sit for it a second time. What is the probability that James will have to repeat one of the papers?

Answer: (ii) (a) _____ (b) _____ (iii) _____
(8 marks)

14. (a) Complete the table below for $y = 2x - x^2$.

x	-2	-1	0	1	2	3
$2x$	-4		0		4	
$-x^2$	-4		0		-4	
y	-8		0		0	

(b) Use this table to draw the graph of $y = 2x - x^2$ for values of x from -2 to 3, using 2 cm for 1 unit on both axes.

(c) On the same axes draw the graph of $y = x - 3$.

(d) Use your graphs to solve the equation $x^2 - x - 3 = 0$.

(9 marks)