JUNIOR LYCEUMS ANNUAL EXAMINATIONS 2003

Educational Assessment Unit — Education Division

FORM 4 **MATHEMATICS (Non Calculator Paper)** **Time: 20 min**

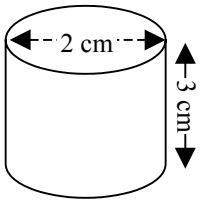
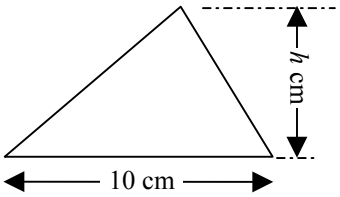
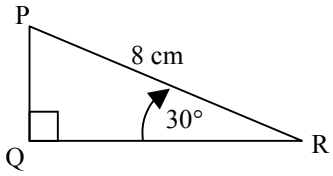
Name: _____ **Class:** _____

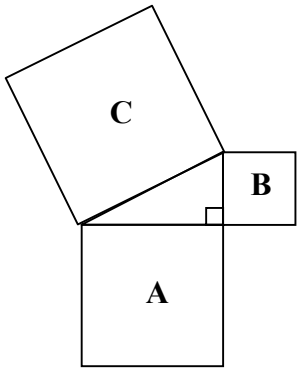
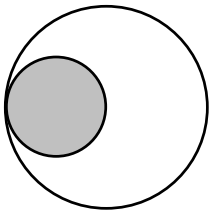
Mark

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 pen, pencil and 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	The speed of light is about 300,000 kilometres per second. How fast does light travel in 1 minute? Give your answer in **standard form**. **Answer:** _____	
2	**Subtract** $\frac{3}{10}$ from $\frac{2}{5}$. **Answer:** _____	
3	The sum of the ages of 6 children is 54 years. What is the **mean** age? **Answer:** _____	
4	Evaluate: $9^0 + 9^{1/2}$ **Answer:** _____	
5	A bag of flour contains 500 grams of flour. How many bags can be made out of 8 kg of flour? **Answer:** _____	
6	Work out: $\sqrt{1\frac{9}{16}}$ **Answer:** _____	
7	The area of a square is 64 cm^2. Work out the **perimeter** of the square. **Answer:** _____	
8	At a sale prices are reduced by 40%. What do I pay for a shirt marked Lm15? **Answer:** _____	

9	**Estimate** the volume of this cylinder.  **Answer:** _____	
10	The area of this triangle is 20 cm^2. Work out the value of h.  **Answer:** _____	
11	Work out the length of PQ. (sin 30° = 0.5)  **Answer:** _____	
12	The equation of a straight line is $\boldsymbol{y = 3x - 2}$. The point P(−1, y) lies on the line. What is the value of $\boldsymbol{y}$? **Answer:** _____	
13	Which of the following is a solution of the quadratic equation $2x^2 - x = 3$? **A.** 2 **B.** −2 **C.** −1 **D.** 1 **Answer:** _____	
14	If $\mathbf{200 = 2^3 \times 5^x}$, what is the value of $\boldsymbol{x}$? **Answer:** _____	
15	The formula $C = \frac{5}{9}(F - 32)$ is used to change °F to °C. Use this formula to change −4°F to °C. **Answer:** _____	

16	Three squares are drawn on the sides of a right-angled triangle. The area of square C is 100 cm^2 and the area of square B is 36 cm^2. What is the area of square A?  **Answer:** _____	
17	A man is paid Lm7.99 per hour. How much will he earn for a 40-hour week? **Answer:** _____	
18	Evaluate: $75^2 - 25$ **Answer:** _____	
19	The radius of the larger circle is twice the radius of the smaller circle. Work out: $\frac{\text{Area of small circle}}{\text{Area of big circle}}$  **Answer:** _____	
20	Mario was asked to solve the equation $x^2 + 5x = 6$. The following is his work. There is a mistake in one of these steps. Which? **Step 1:** $x^2 + 5x - 6 = 0$ **Step 2:** $(x - 1)(x + 6) = 0$ **Step 3:** $x - 1 = 0$ or $x + 6 = 0$ **Step 4:** $x = -1$ or $x = 6$ **Answer:** _____	

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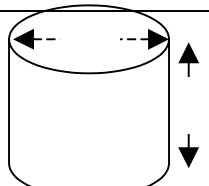

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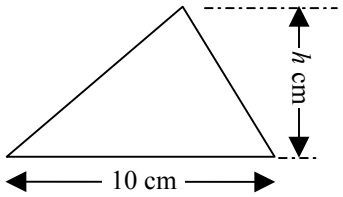
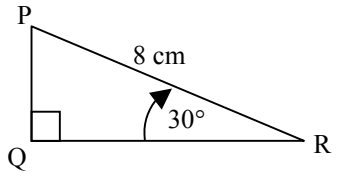
10	The area of this triangle is 20 cm^2. Work out the value of h.  **Answer:** _____	
11	Work out the length of PQ. (sin 30° = 0.5)  **Answer:** _____	
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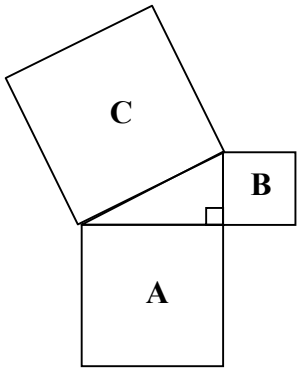
16	Three squares are drawn on the sides of a right-angled triangle. The area of square C is 100 cm^2 and the area of square B is 36 cm^2. What is the area of square A?  **Answer:** _____	
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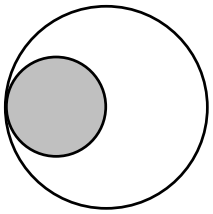
19	The radius of the larger circle is twice the radius of the smaller circle. Work out: $\frac{\text{Area of small circle}}{\text{Area of big circle}}$  **Answer:** _____	
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FORM 4 **MATHEMATICS (MAIN)** **Time: 1 hour 40 min**

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

Name: _____ **Class:** _____

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

1. **Work out** $(\frac{1}{2})^5$. Give your answer
   (i) as a fraction
   (ii) in standard form,

Answer: (i) _____ (ii) _____

(2 marks)

---

2. The table shows the profit made by three firms: A, B and C.
   (i) Which firm made the greatest profit?
   (ii) Change A's profits to US dollars. (Lm1 = $2.35)

Firm	Profit (Lm)
A	2.35×10^5
B	8.7×10^4
C	195 000

Answer: (i) _____ (ii) _____

(3 marks)

3. In cell A2 John types 9 and in cell B2 he types the formula **=A2*2+5** (Figure 1).
   (i) What number will appear in cell B2 when John presses the **Enter** key?
   (ii) John changes the number in cell A2 and he gets 11 in cell B2. What number did he type in cell A2?

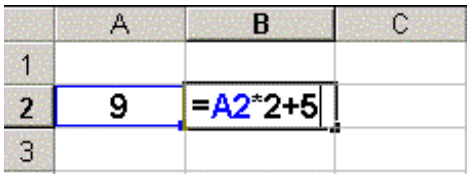

Figure 1

Answer: (i) _____ (ii) _____

(4 marks)

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4. At the end of 1990 there were 4000 members of a certain rare breed of animal remaining in the world. It is estimated that their number will **decrease** by 12% of the value at the beginning of **each year**. Estimate, to the nearest 100, how many will be left at the end of (i) 1991, (ii) 1994.

Answer: (i) _____ (ii) _____

(4 marks)

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5. Figure 2 shows a block of wood with a hole of radius 3.5 cm in it. Work out, correct to 2 decimal places, the volume of the wood.

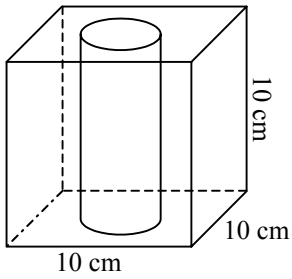

Figure 2

Answer: _____

(6 marks)

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6. A box measures 8 cm by 12 cm by 5 cm (Figure 3). Calculate,

(i) the length of AC and BH, giving your answer correct to 1 decimal place;

(ii) the size of angle DBH, giving your answer correct to the nearest degree.

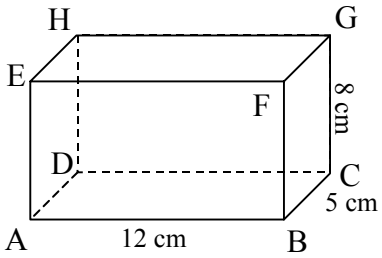

Figure 3

Answer: (i) AC = _____ BH = _____ (ii) _____

(6 marks)

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7. In figure 4, AB is parallel to DE. ACE is a straight line and AC = 6 cm.

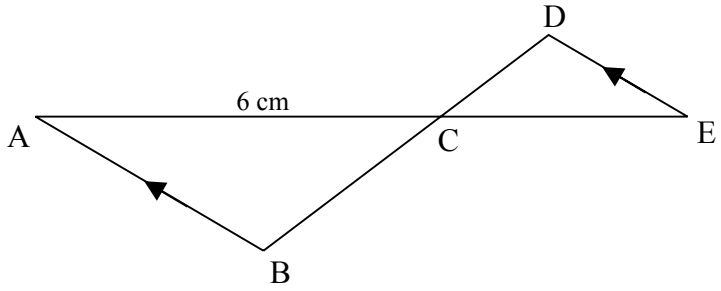


Figure 4

(i) Show that triangles ABC and CDE are similar.

(ii) If AC**:**CE = 3**:**2, work out the length of CE.

(iii) The area of triangle ABC is 13.5 cm^2. Work out the area of triangle CDE.

Answer: (ii) _____ (iii) _____

(6 marks)

---

8. The procedure **TRIANGLE** draws an equilateral triangle.

(i) Complete the procedure.

TO _____

REPEAT _____ [FD 80 RT _____]

END

The procedure **POLYGON** draws a polygon.

```
TO POLYGON
    REPEAT 6 [TRIANGLE RT 60]
END
```

Complete the following statements:

(ii) This polygon is called a _____ _____**.**

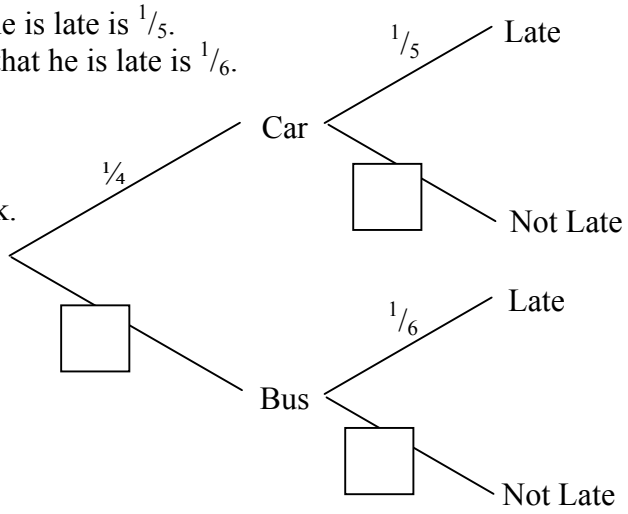
(iii) The **order of rotation** of this polygon is _____.

(iv) The **perimeter** of this polygon is _____ turtle steps.

(6 marks)

---

9. Each morning a man either drives or takes a bus to work. The probability that he drives is ¼.
If he drives the probability that he is late is $^1/_5$.
If he takes a bus the probability that he is late is $^1/_6$.
Complete the tree diagram.
Find the probability that
(i) the man drives and is late,
(ii) the man is not late for work.



Answer: (i) _____ (ii) _____

(8 marks)

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10. In Figure 5, BP and AP are tangents to a circle with centre O. Angle AOB = 138°.
    (i) By proving that triangles BPO and APO are congruent, show that BP = AP.
    (ii) Work out the size of angle APB.
    (iii) Work out the size of angle BCA, giving a reason for your answer.
    (iv) Point C is dragged onto point D. Work out the size of angle BDA, giving a reason for your answer.

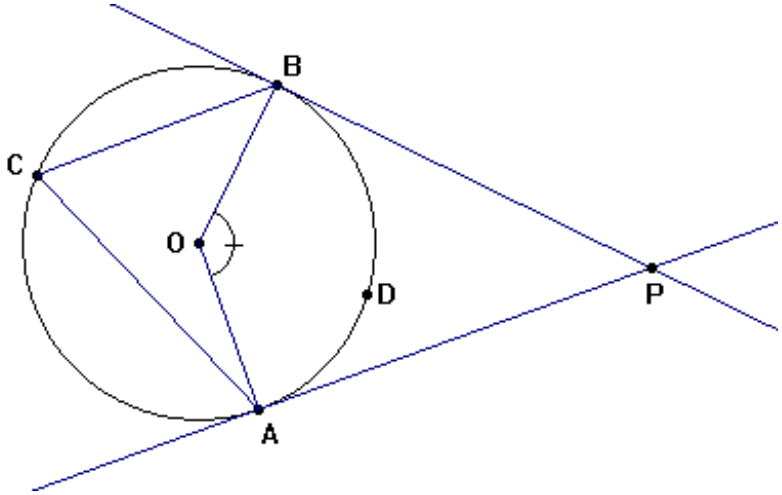


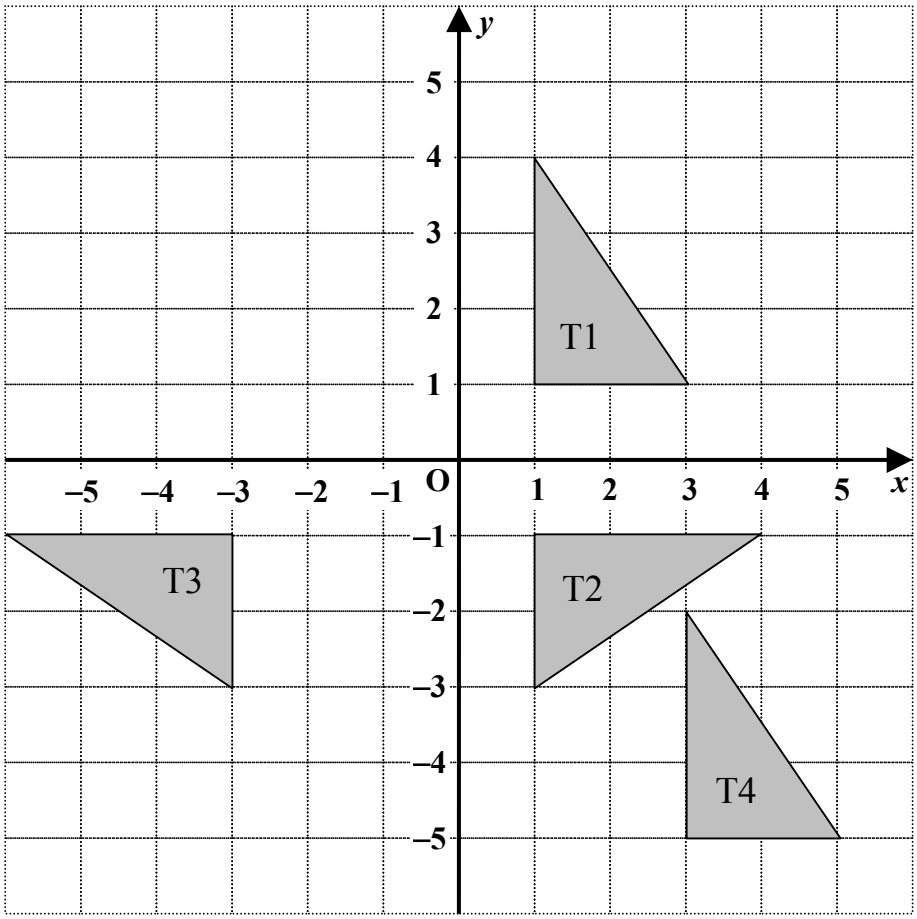
Figure 5

Answer: (ii) _____ (iii) _____ (iv) _____

(8 marks)

11. (a) Describe the **single transformation** that will transform
    (i) triangle T1 to triangle T2,
    (ii) triangle T2 to triangle T3.
    (iii) triangle T4 to triangle T1

(b) Triangle T2 is rotated through an angle of 180° about the point (0, 0). **Draw** the image of T2 and label it T5.



(i) _____

(ii) _____

(iii) _____

(8 marks)

12. (a) Use the formula $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to solve the equation $2x^2 = 3x + 7$, giving your answer correct to 3 significant figures.

(b) Factorise: $x^2 - 2x - 8$

(c) The area of the square is equal to the area of the rectangle (Figure 6). Form an equation in x and solve it to find the value of x.

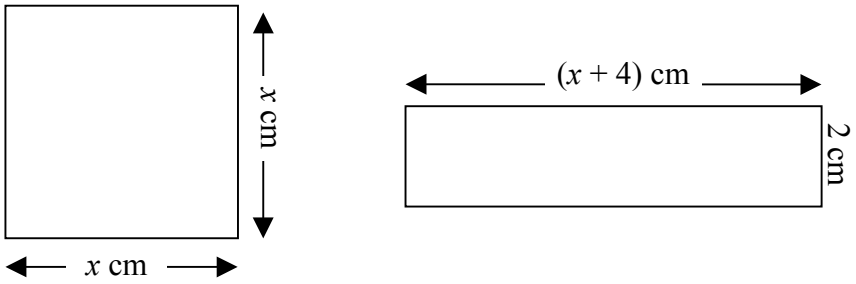
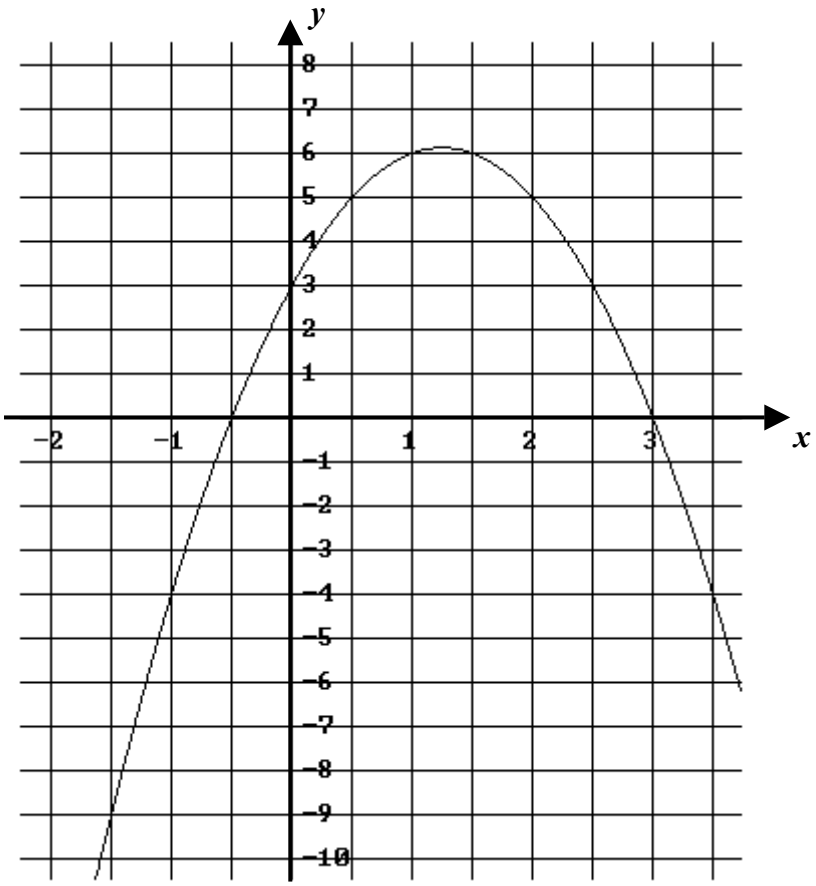


Figure 6

Answer: (a) _____ (b) _____ (c) _____

(9 marks)

13. The graph of $y = 3 + 5x - 2x^2$ is shown below.



Use this graph to solve the equations

(i) $3 + 5x - 2x^2 = 0$

(ii) $7 + 5x - 2x^2 = 0$

Complete the table and draw, on the same axes, the graph of $y = 3x - 1$.

x	−2	0	2
y		−1	

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

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

(10 marks)