



CATHOLIC HIGH SCHOOL

END-OF-YEAR EXAMINATION 2006

Subject : **MATHEMATICS**

Level : **Secondary 2**

Date : **12 Oct 2006**

Marks : **80**

Time : **0800h – 1000h**

Name : _____ ()

Class : **Sec 2 - _____**

INSTRUCTIONS :

Do not open this booklet until you are told to do so.

Write your name, class index number clearly at the top of this page and on any separate answer paper used.

INFORMATION FOR CANDIDATES

- All questions must be attempted.
- All answers are to be written in the SPACES provided.
- The use of calculators **is allowed** in the computation of answers.
- Working must be shown clearly in ink.
- Omission of essential working will result in loss of marks.
- Unless otherwise stated, all **non-exact** answers are to be calculated to **3 significant figures** and all non-exact **angles** are to be calculated to **1 decimal place**.
- The number of marks is given in brackets [] at the end of each question or part.

This question paper consists of 10 printed pages, excluding this cover page.

1. Express the following in standard form, correct to 3 significant figures.

a) $37\,419 \times 10^5$

b) 0.004 795

[1]

[1]

2. i) An exterior angle of a regular n -sided polygon measures 30° . What is the value of n ?

[1]

ii) What is the value of each interior angle of this polygon?

[1]

3. In a factory, 10 workers can produce a certain number of motherboards in 12 days. How many workers are required if the same number of motherboards are to be produced in 8 days' time? Assume that all workers work at the same rate.

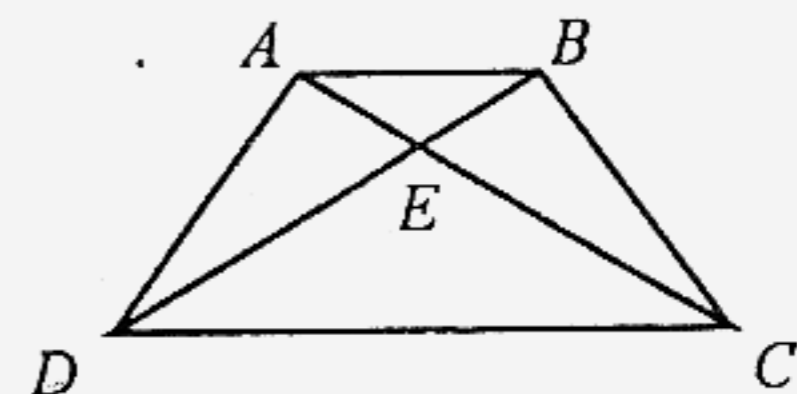
[2]

4. a) Peter tried selling his used car at a certain price on the internet. But due to a lack of response, he reduced the price by 20 %. John responded to the online auction, but he negotiated for an additional discount of 15 % and Peter agreed. John paid Peter \$ 34 000 for the car. What was the price of the car when Peter first put it up on the internet for sale? [2]

b) John borrowed \$ 20 000 from a loan shark who charged him a compound interest of 5 % per annum to finance the car. How much interest did John owe the loan shark at the end of the 3 years? [2]

5. The diagram on the right shows a trapezium $ABCD$, where $\triangle ACD$ is congruent to $\triangle BDC$. State

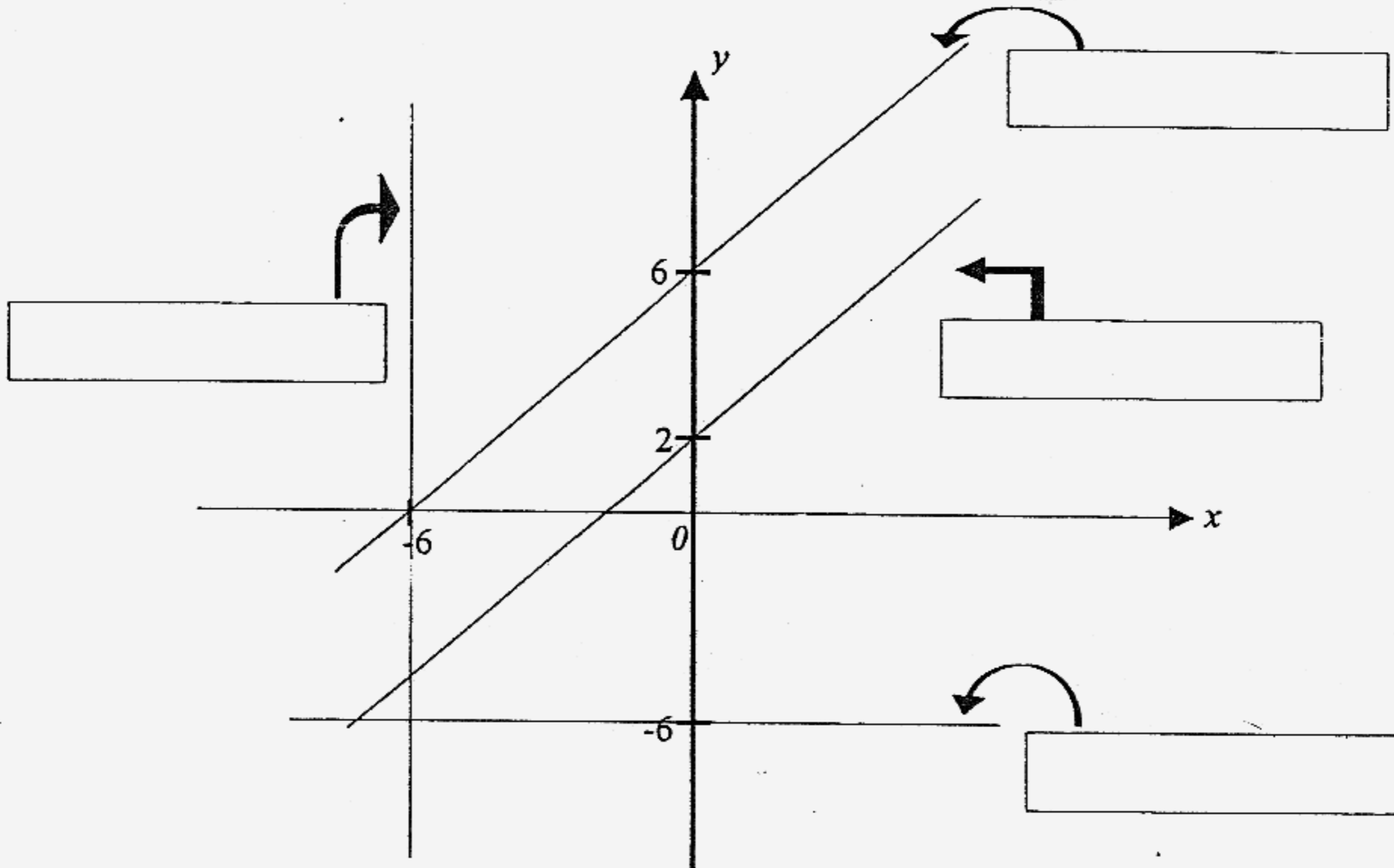
- i) another pair of congruent triangles, [1]
- ii) a pair of similar triangles. [1]



6. Fill in each box with the equation that describes the line.

[4]

$y = x + 6$	$y = x + 2$	$y = -6$	$x = -6$
$y = -x - 6$	$y = -x + 2$	$y = -x - 2$	$y = -x + 6$



7. On a certain model, objects are made based on the ratio of 1 : 220. On the model is a train station covering an area of 75 cm^2 . Calculate,

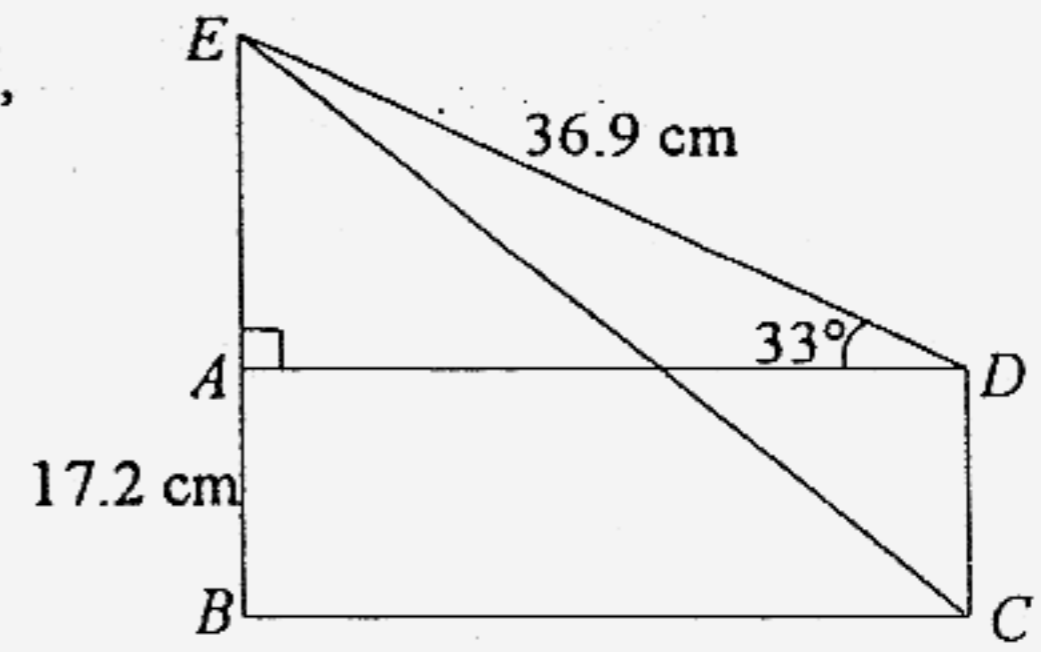
- how long a model train should be, in centimetres, if it is to resemble a real train measuring 11 metres in length.
- the actual area of the train station in square metres.

[1]

[2]

8. In the figure, $ABCD$ is a rectangle where $AB = 17.2$ cm, $DE = 36.9$ cm and $\angle EDA = 33^\circ$. Calculate

- a) AE , [1]
- b) AD , [1]
- c) $\angle DEC$. [4]



9. Factorise completely the following expressions:

a) $4y^2 - 24y + 36$

[2]

b) $3pq + qr - 9p^2 + r^2$

[3]

10. PQR is a right-angled triangle with sides $PQ = (x - 2)$ cm, $QR = (x - 1)$ cm, and $PR = x$ cm.

a) Form an equation in x , and show that it can be reduced to $x^2 - 6x + 5 = 0$.

[2]

b) Hence, calculate the area of ΔPQR .

[4]

11. Solve the following equations:

a) $\frac{7}{3n-2} + \frac{9}{6n-4} = \frac{23}{26}$ [3]

b) $x(2x+3) + 8 = 7$ [3]

12. Simplify $\frac{x+3}{x^2+x} + \frac{x-3}{x^2-1}$ [4]

13. The formula for calculating the selling price, S , of an article is given by

$$S = C \left(1 + \frac{P}{100} \right)$$

where the cost price is C and the percentage profit is $P\%$.

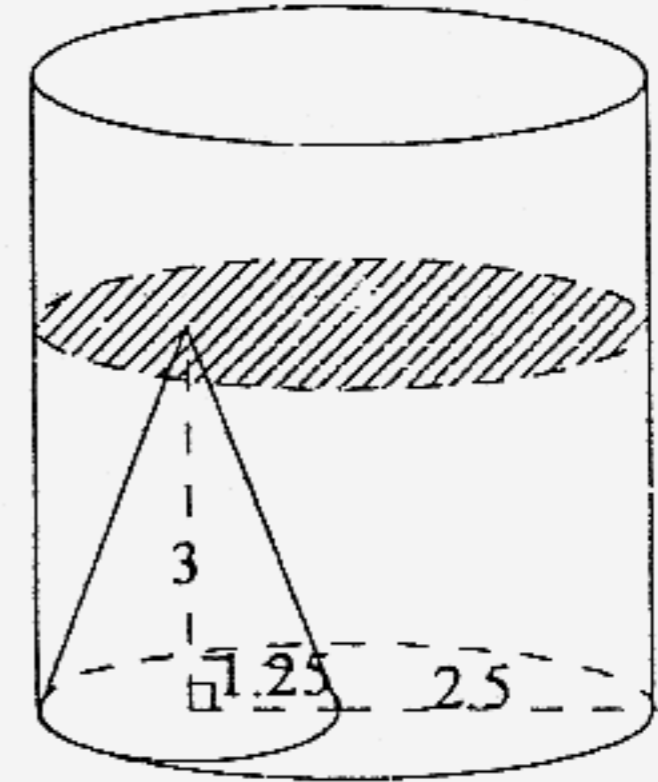
- a) Find the cost price of an article if it is sold for \$546 at a profit of 20%. [2]
- b) Make P the subject of the formula. Hence find the percentage profit when an article is sold for \$320, given that the cost price is \$256. [4]

14. To wash a solid conical machine part of radius 1.25 m and height 3 m, a worker lowers it into a cylindrical container whose base radius is 2.5 m. The container then begins to fill with water until the vertex of the machine part is exactly covered. It is then removed from the container.

(Assuming no water remains on the surface of the machine part),

Calculate:

- a) the total surface area of the cone, [3]
- b) the volume of water in the cylindrical container, [3]
- c) the final depth of the water in the container after the cone is removed. [2]



Solve the following question using simultaneous linear equations.

15. Tony walked for 5 h and cycled for 4 h, covering a total distance of 97 km. Later he walked for 3 h and cycled for 3 h, covering 69 km. What were his speed of walking and his speed of cycling if his speed in each case is constant?

[4]

16. A marble lies on the ground between two equal-height buildings 50 metres apart. If the angles of depression of the marble from the top of the buildings are 41° and 67° respectively, and the horizontal distance between the marble and the building it is closer to is x m, find x .

[5]

17. Answer the whole question on a sheet of graph paper.

The variables x and y are connected by the equation

$$y = 2x^2 + 2x - 10$$

The following table gives some corresponding values of x and y .

x	-4	-3	-2	-1	0	1	2	3	4
y	s	2	t	-10	-10	-6	2	r	30

- (a) Calculate the values of s , t and r . [3]
- (b) Taking 2 cm to represent 1 unit on the x -axis and 1 cm to represent 2 units on the y -axis, draw the graph of $y = 2x^2 + 2x - 10$ for $-4 \leq x \leq 4$. [3]
- (c) Find, from your graph,
- (i) the value of x for which $y = 18$, [1]
 - (ii) the value of y for which $x = -2.5$, [1]
 - (iii) the least value of y . [1]
- (d) Using the graph, solve the quadratic equation $2x^2 + 2x - 10 = 0$. [2]

Answers

1. (a) 3.74×10^9 (b) 4.80×10^{-3}
2. (i) 12 (ii) 150
3. 15
4. (a) 50 000 (b) 3152,50
5. (i) DAB congruent to CBA or AED congruent to BEC (ii) EAB similar to ECD
7. (i) 5 (ii) 368
11. (a) 5 (b) -0.5, -1
12. $\frac{2x-3}{x(x-1)}$
13. (a) 455 (b) $P = \frac{100(S-C)}{C}$, 25%
14. (a) 17.7 (b) 54.0 (c) 2.75
15. 5 km/h, 18 km/h
16. 13.5
17. (a) 14, -6, 14 (c) (i) 3.3 (ii) -2.6 (iii) -10.6 (d) -2.8, 1.75