

THE G C SCHOOL OF CAREERS



SAMPLE EXAMINATION PAPER

MATHEMATICS

FORM: 2 TO 3

Time allowed: 2 hours

2010-2011

NAME: _____

INSTRUCTIONS TO CANDIDATES

- This paper has **24** questions.
- Answer **ALL** questions in the space provided.
- Make sure that your answers are clearly labelled.
- Answers without working may gain no credit.

1. Use your calculator to work out the value of:

$$2.6 - \frac{9.8}{2.7 + 1.2}$$

Give your answer as a decimal.

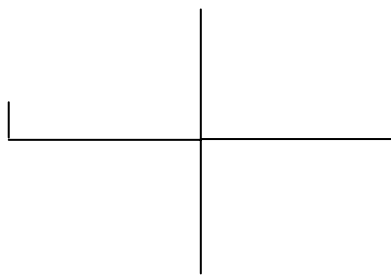
Write down all the figures on your calculator display.

(2 marks)

2. If the point $(4, p)$ lies on the line with equation $3x - y = 5$, find the value of p .

(2 marks)

3. For the shape shown,



- (a) State the number of lines of symmetry:

(1 mark)

- (b) State the order of rotational symmetry:

(1 mark)

4. Given that $A = 6 \times 10^7$ and $B = 4.5 \times 10^9$ respectively, find **in standard form** the value of $A \times B$.

(2 marks)

5. Make w the subject of the formula $c = \sqrt{\frac{4w}{w+a}}$.

(2 marks)

6. Find the equation of a straight line which is parallel to the line $y - 2x = -3$ and passes through the point $(-3, 4)$.

(3 marks)

7. Expand and simplify the following:

$$(3x - 2)^2 - 3(x + 2) - (x - 4)(x + 4) =$$

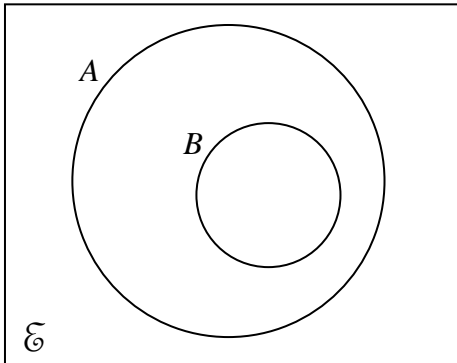
(3 marks)

8. A square has sides of length x cm and a rectangle has sides of length $(x-3)$ cm and $(x+23)$ cm respectively. If the perimeter of the rectangle is six times the perimeter of the square, write down an equation in terms of x and solve it to find the value of x .

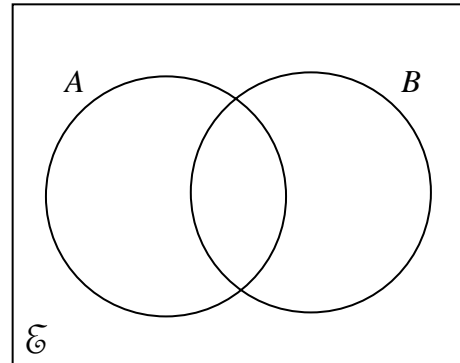
(3 marks)

9. Shade the regions described by:

(a) $A \cap B$



(b) $A' \cup B$



(2 marks)

10. John's father is 38 years old and John is 25 years younger. Find in how many years from now, the age of the father will be twice the age of his son.

(4 marks)

11. (a) Simplify $2x^5 \cdot x^{-3} \cdot \frac{2}{3}x =$

(2 marks)

(b) Evaluate $\left(-\frac{3}{5}\right)^{-2} =$

(2 marks)

12. Solve the following pair of simultaneous equations:

$$4x + 3y = 13$$

$$3x - 2y = 14$$

(4 marks)

13. (a) Solve the inequality $6 + x < 2x + 4 \leq 34 - 3x$, and represent your solution on a number line.

(3 marks)

(b) Hence, give all the integer values of x which satisfy the above inequality.

(1 mark)

14. Factorize the following **completely**:

(a) $24p^3q - 15pq^2 =$

(2 marks)

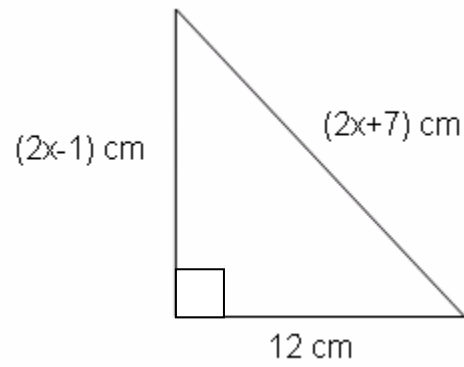
(b) $16 - x^4 =$

(2 marks)

(c) $9(x - 2y) + x^2(2y - x) =$

(3 marks)

15. Find the value of x .



(3 marks)

16. Find the value of x .

(a) $(2^5)^x = 32$

(2 marks)

(b) $4^{-2x} = 64 \times \frac{1}{16}$

(2 marks)

17. Simplify the following:

(a) $\frac{3x^2 + 3xy}{x^2 - y^2} =$

(3 marks)

(b) $\frac{2ax - ay + 2bx - by}{2x^2 - 4x} \div \frac{2x^2 - xy}{x^2 - 4} =$

(4 marks)

18. Solve the following equations:

(a) $5x^2 - 60x = 0$

(2 marks)

(b) $(3x - 7)^2 - 1 = 15$

(3 marks)

(c) $\frac{3}{3x-15} - \frac{x-2}{x^2-25} = \frac{1}{3(x+5)}$

(4 marks)

19. An aircraft flies 400Km from point A on a bearing of 70° to point B. It then flies 700Km on a bearing of 160° to arrive at point C.

(a) Draw a diagram to show the positions of the points A, B and C.
(2 marks)

(b) Find the distance AC, giving your answer to the nearest whole number.
(2 marks)

(c) Find the bearing of A from C, to the nearest degree.
(2 marks)

20. $\mathcal{E} = \{x : 1 \leq x \leq 12\}$

A = Prime numbers

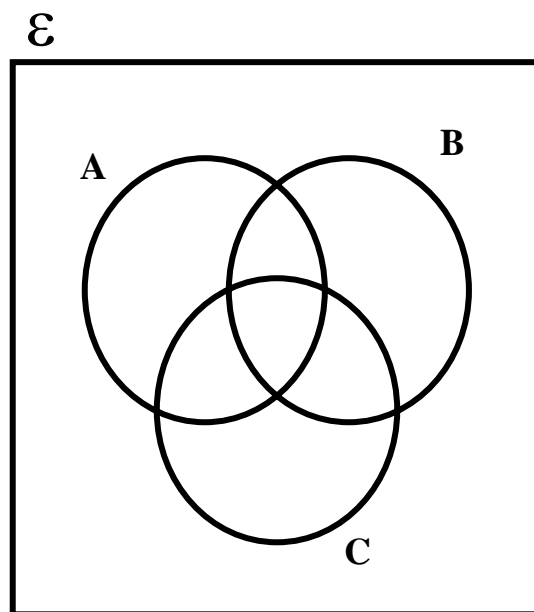
B = Odd numbers

C = $\{x : 6 \leq 3x < 18\}$

(a) List the elements of the set C.

(1 mark)

(b) Complete the Venn diagram.

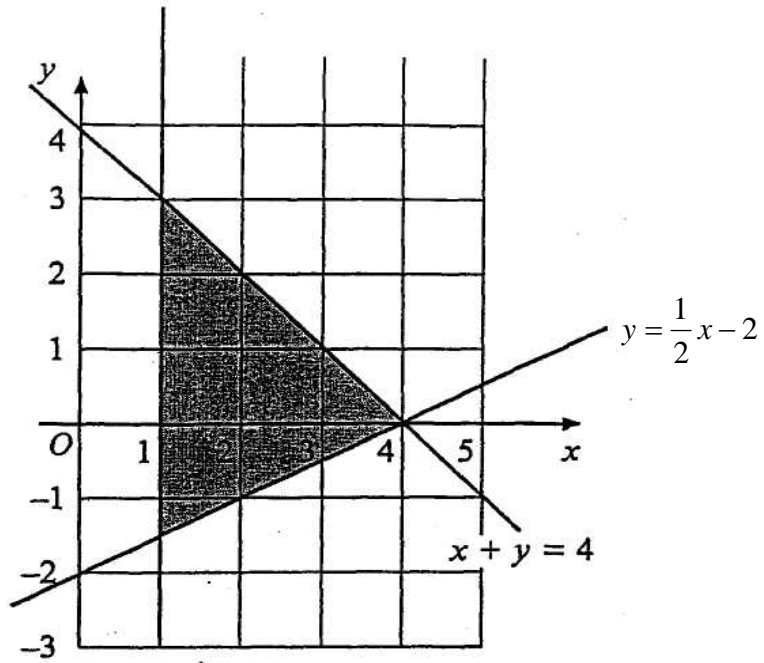


(3 marks)

(c) List the elements of $(A \cup C)' \cap B$.

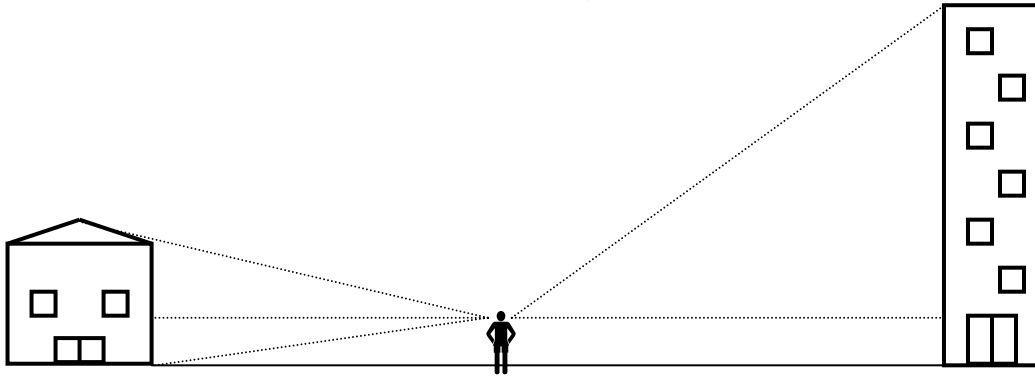
(1 mark)

21. By showing all your steps write down the three inequalities which define the shaded region.



(3 marks)

22. A man is standing 50m away due west of a building and 40m due east of a house. He observes the top of the building with an angle of elevation 70° , and the bottom of the house with an angle of depression 3° .



By giving all your answers correct to 2 decimal places:

(a) Calculate the height of the man.

(2 marks)

(b) If the height of the house is 5m, find the angle of elevation when he observes the top of the house.

(2 marks)

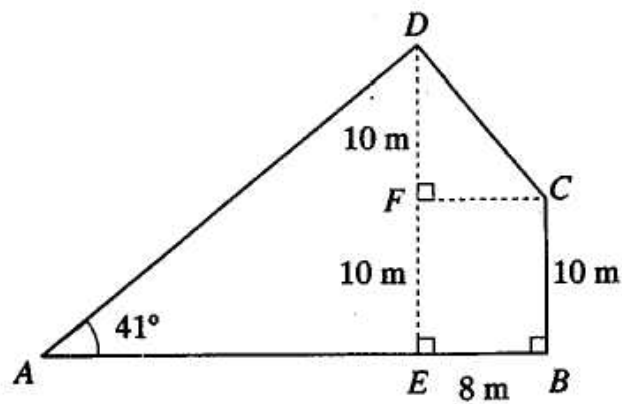
(c) Calculate the height of the building.

(3 marks)

23. In the figure, $ABCD$ represents the cross-section through a building. The perpendicular from D meets AB in E . CF is perpendicular to DE . Angle $DAE = 41^\circ$. $DF = FE = CB = 10\text{ m}$ and $EB = 8\text{ m}$.

Calculate, to 3 significant figures:

- (a) angle DCF , (2 marks)
- (b) the length, in metres, of DC , (2 marks)
- (c) the length, in metres, of AB . (2 marks)



24. (a) Sketch the following straight lines on the same set of axes:

$$L_1 : y - 2x = 1$$

$$L_2 : x + y = 10$$

(3 marks)

(b) Find the gradient of L_2 .

(1 mark)

(c) Find the coordinates of the point of intersection between the two lines L_1 and L_2

(2 marks)

TOTAL MARKS FOR PAPER: 100

END