End-of-year Examination 1

Paper I (50 m) **Time: 1 h**

Instructions: Calculators are allowed in this paper. Write your working and answers in the spaces provided. The number of marks for each question or part question is indicated in brackets [ ].

1. (a) 35% of a number is 21. What is the number? [1]

Answer: _____

(b) Express 30 km/h in m/min. [1]

Answer: _____

2. (a) If $2^x \times 16 = 64$, find the value of x. [1]

Answer: _____

(b) If $a = 6.15 \times 10^6$ and $b = 3 \times 10^4$, evaluate $a \div b$. [1]

3. Factorise the following.

(a) $2xy^2 + 2xy$ [1]

Answer: _____

Answer: _____

(b) $4xy - 2xz + 2y - z$ [1]

Answer: _____

4. Solve the following equations.

(a) $\frac{3}{4x} = 5\frac{1}{4}$ [1]

Answer: _____

(b) $(2x - 3)^2 = 64$ [1]

Answer: _____

5. Solve the simultaneous equations.
$4a - 5b = 40$
$3a + 2b = 7$
[2]

Answer: _____

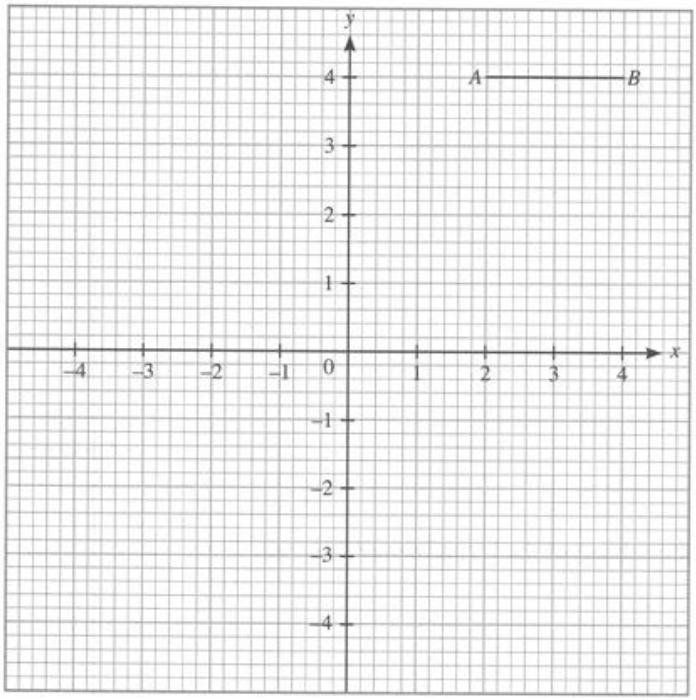
6. (a) Make a the subject of the formula in $ah = f - ag$. [1]

Answer: _____

(b) Express y in terms of j, k and h given that $j^2 = \frac{3y + h}{4y}$. [2]

Answer: _____

7. A and B are the coordinates $(2, 4)$ and $(4, 4)$ respectively. State the coordinates of the image of line AB, $A'B'$ under the following transformations.



(a) A reflection of AB using the y-axis as the mirror line. [1]

Answer: A' = _____

B' = _____

(b) A rotation of AB clockwise 90° using $(0, 0)$ as the centre of rotation. [1]

Answer: A' = _____

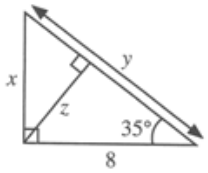
B' = _____

(c) A translation of AB parallel to the y-axis 2 units in the negative direction. [1]

Answer: A' = _____

B' = _____

8. Find the values of x, y and z in the figure shown. Give your answers correct to 1 decimal place. Dimensions are given in cm. [3]



Answer: $x =$ _____

$y =$ _____

$z =$ _____

9. (a) Simplify $\frac{a^2 + 2ab + b^2}{a^2 - b^2} \times \frac{b - a}{a + b}$. [2]

Answer: _____

(b) Using factorisation, evaluate $\frac{0.86^2 - 0.14^2}{2}$. [2]

Answer: _____

10. (a) State the gradient and the y-intercept of the graph $3y = 4x + 5$. [2]

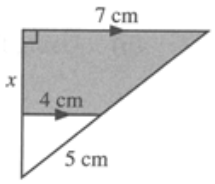
Answer: gradient = _____

y-intercept = _____

(b) A straight line, AB, is parallel to $y = 3x + 2$ and passes through the point $(0, 4)$. State the equation of the line AB. [2]

Answer: _____

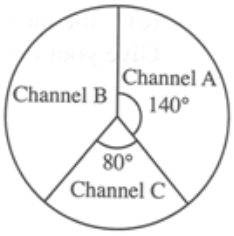
11. In the figure shown, find
(a) the value of x, [2]
(b) the area of the shaded part. [2]



Answer: (a) _____

(b) _____

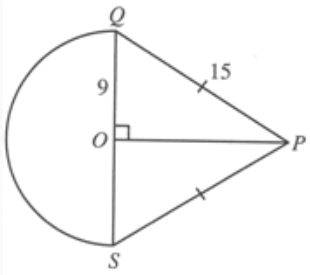
12. During a survey on the favourite TV channels of some people, the information obtained was displayed in a pie chart as shown.
(a) If 280 people chose Channel A, how many people took part in the survey? [2]
(b) What is the percentage of the people who chose Channel B? [2]



Answer: (a) _____

(b) _____

13. The figure shows a semicircle with O as its centre. PQS is an isosceles triangle. If $OQ = 9$ cm, and $PQ = PS = 15$ cm, find
(a) the length of OP, [2]
(b) the area of the figure. [2]
(Take $\pi = 3.14$)



Answer: (a) _____

(b) _____

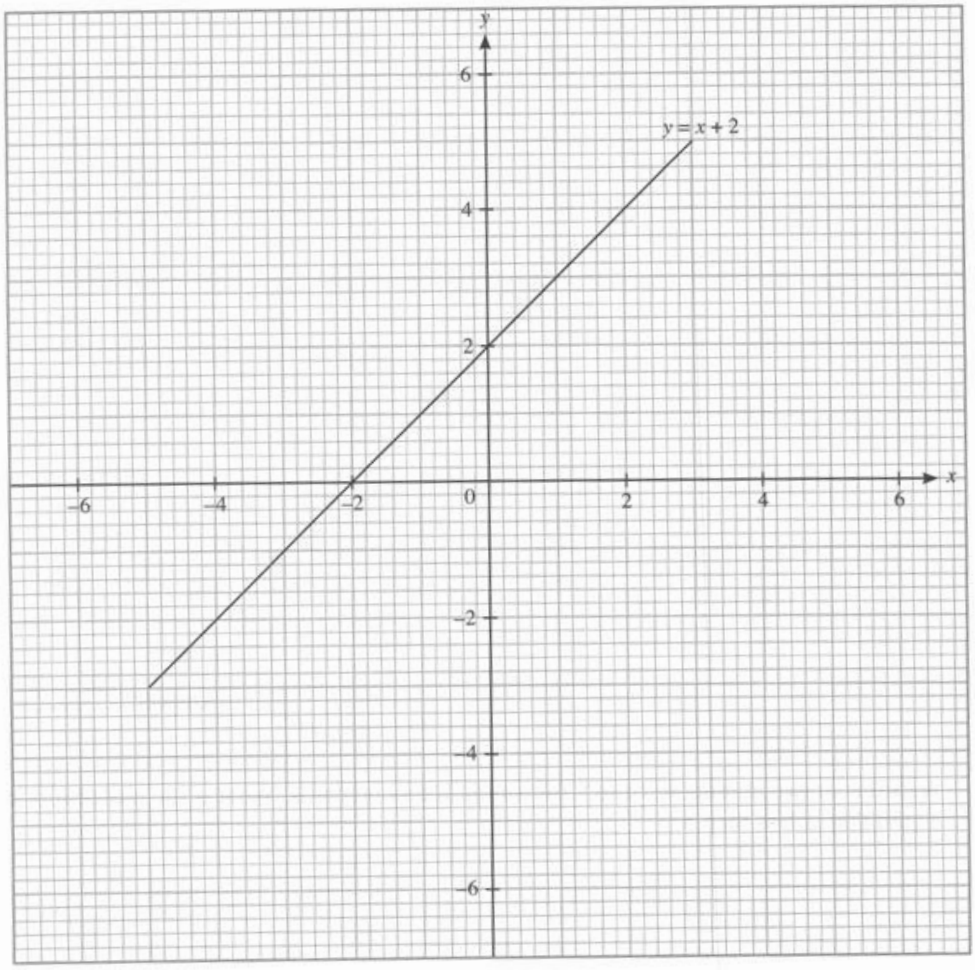
14. Study the following set of numbers.
10.2, 10, 10.5, 10.3, 10.2, 10.4
Find
(a) the mode, [1]
(b) the median, [1]
(c) the mean. [1]
Give your answers correct to 4 significant figures.

Answer: (a) _____

(b) _____

(c) _____

15. (a) The graph of $y = x + 2$ is shown on the grid. On the same axis, draw the graph of $y = -x$. [2]



(b) Hence, solve $y = x + 2$ and $y = -x$ simultaneously. [2]

Answer: (b) _____

16. In a regular polygon with n sides, the ratio of the size of its exterior angle to the size of its interior angle is 1 : 4. Find the value of n. [2]

Answer: _____

17. A card is drawn at random from a full suit of diamond cards. What is the probability of drawing a card that is less than 5? [2]

Answer: _____

Paper II (50 m) **Time: 1 h 15 min**

Instructions: Calculators are allowed in this paper. The number of marks for each question or part question is indicated in brackets [ ].

1. (a) Subtract $(3a + b)^2$ from the sum of $(5a - b)^2$ and $(a - b)^2$. [2]

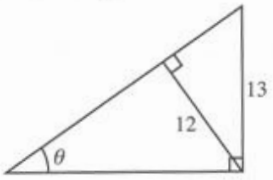
   (b) If $a = 2$ and $b = 3$, evaluate $\frac{b^a}{a^b}$. [2]

2. (a) Given that $x^2 = \sqrt{7.236^2 + 3.213^2}$, find the value of x. Give your answer correct to 3 significant figures. [2]

   (b) The difference between two numbers is 8. The larger number is $\frac{4}{3}$ of the smaller number. Find the product of the two numbers. [2]

3. (a) A straight road slopes uphill at an angle of 12°. What is the distance a person must walk from the foot of the hill to the hill top if the height of the hill is 25 m? [2]

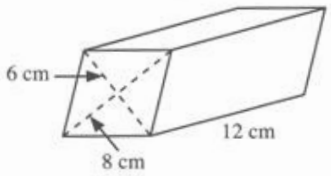
   (b) Calculate the size of angle θ in the figure shown. Dimensions are given in cm. [2]



4. The figure shows a prism with a rhombus as its cross-section. If the diagonals of the rhombus are 6 cm and 8 cm respectively, calculate

   (a) its volume, [2]

   (b) its total surface area. [3]



5. The internal radius of a cylindrical glass is 2.8 cm. Its internal height is 20 cm. It is half-filled with water. The water is then poured into a vase with a cross-section of a square. If the internal dimensions of the vase are 5 cm by 5 cm by 15 cm, calculate

   (a) the depth of water in the vase, [2]

   (b) the total surface area of the vase not in contact with the water. [3]

   $\left(\text{Take } \pi = \frac{22}{7}\right)$

6. The volume of a larger sphere is 8 times the volume of a smaller sphere. If the radius of the smaller sphere is 2.5 cm, find

   (a) the radius of the larger sphere, [3]

   (b) the ratio of the surface area of the larger sphere to the surface area of the smaller sphere, [2]

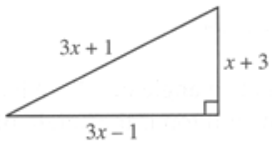
   (c) the volume of the larger sphere in terms of π. [2]

7. The diagram shows a right-angled triangle with sides $(3x - 1)$ cm, $(3x + 1)$ cm and $(x + 3)$ cm.

   (a) Form an equation in terms of x and show that it reduces to $x^2 - 6x + 9 = 0$. [3]

   (b) Solve the equation. [2]

   (c) Hence, find the area of the triangle. [2]



8. In $\triangle ABC$, the angles at A and B are 30° and 135° respectively. AB is 10 cm. Calculate

   (a) the length of the perpendicular from C to AB produced, [3]

   (b) the length of BC, [2]

   (c) the perimeter of $\triangle ABC$. [2]

   Give your answers correct to 3 significant figures.

9. The table below shows the Mathematics test marks obtained by some students in a class.

Marks	0	1	2	3	4	5	6	7	8	9	10
Number of students	2	3	2	4	5	3	7	4	2	1	1

   Find

   (a) the modal score, [1]

   (b) the median score, [2]

   (c) the mean score, [2]

   (d) the percentage of students who failed the test if the passing mark is 6. [2]