THIRD FORM MATHEMATICS
Promotion Examination 2010

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Time $1\frac{3}{4}$ hours

180 Copies

INSTRUCTIONS

This question paper consists of FOUR printed pages.
Write your name clearly on **EACH** sheet of paper used.
Number your answers carefully and do **NOT** do questions beside one another.

All of the questions are to be attempted.
Calculators are allowed.
Graph paper is available if required.

If a numerical answer cannot be given **exactly**, and the accuracy required is not specified in the question, then in the case of an angle it should be given to **one (1)** decimal place, in other cases it should be given correct to **three (3)** significant figures.

Write on your foolscap the **LETTER** that matches your response for Questions 1 – 5.
All working **MUST** be shown for questions 6 – 18.

1. The number 0.02856 correct to 3 significant figures is:

(A) 0.028 **(B)** 0.029 **(C)** 0.0286 **(D)** 0.0285

2. If f is a function such that $f(x) = 2x + 1$, and $f(x) = 7$, which of the following pairs satisfy the function?

(A) $(-3, -7)$ **(B)** $(-6, 7)$ **(C)** $(3, 7)$ **(D)** $(-3, 7)$

3. If $a * b$ means $(a - 2b)^2$, then $1 * 2$ is:

(A) -9 **B)** -1 **(C)** 1 **(D)** 9

4. Given that k is a constant, and that p is directly proportional to the reciprocal of q then:

(A) $p = \frac{k}{q}$ **(B)** $q = kp$ **(C)** $p = \frac{q}{k}$ **(D)** $p = kq$

5. Given that $m \in N$, $c \in N$, which one of the following lines passes through the origin In the Cartesian plane:

(A) $y = mx + c$ **(B)** $y = mx$ **(C)** $y = c$ **(D)** $y = m$

[Total: 5]

6. Calculate the simple interest on $1875, invested for 30 months at 3% per annum. [3]

7. The water department charges $ 6.50 per month for the meter rent, $ 25 for the first 150 cubic metres of water used and $ 2.50 for each additional 10 cubic metres used.

Calculate the total bill for the use of 270 cubic metres of water in one month. [4]

8. The Thomas family bought a house for $ 340 000. It appreciates in value by $8\frac{1}{4}\%$ per year. Calculate the value of the house after 2 years. [4]

9. Simplify the following:

(a) $3m^2n^3 \times 4mn^2$ [3]

(b) $9a^{-5} \times \frac{2}{3}a^6$ [2]

10. Make x the subject of $x(a-b) = b(c-x)$ [4]

11. Solve for x, and represent the solution on a number line

$4(x-2) \geq 5x+1$ [6]

12. Solve the pair of simultaneous equations: [5]

$$\frac{3}{4}x+\frac{1}{2}y=8$$
$$\frac{1}{2}x-\frac{1}{2}y=2$$

13. The radius of the circular base of a cylinder is $7x$ *cm*. Its height is $(x-2)$ *cm*.

(i) Sketch a diagram to show the above information [3]

(ii) Taking $\pi = \frac{22}{7}$, find in terms of x, an expression for the volume of the cylinder. (NOTE: Do not use 3.14, 3.142 etc) [3]

14. (a) Using ruler and compasses ONLY, construct and label quadrilateral $ABCD$ such that $AB = 5$ *cm*, $ABC = 90^0$, $BC = 6$ *cm*, $\hat{BAD} = 60^0$ and $AD = 7$ *cm*. [5]

(b) Measure and state the length of CD. [1]

(Full marks will not be awarded unless all construction lines and arcs are clearly shown).

15. (i) Copy and complete the table below for the function $y = 3 - 2x$ for $-2 \leq x \leq 4$.

x	-2	-1	0	1	2	3	4
y	7		3				

[5]

(ii) Using a scale of 1 cm to represent 1 unit on each axis, draw the graph of the function $y = 3 - 2x$ for $-2 \leq x \leq 4$. [4]

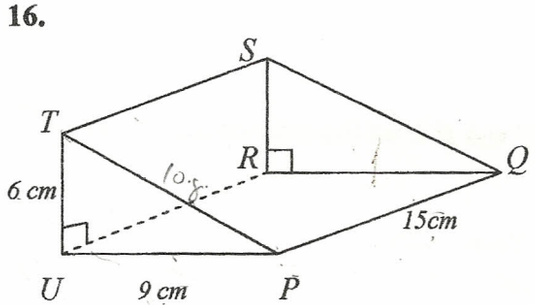
(iii) On your graph

(a) mark the x-intercept with X, and circle it.
(b) state the coordinates of the x-intercept.
(c) mark the y-intercept with Y, and circle it.
(d) state the coordinates of the y-intercept. [4]

(iv) Find

(a) the length of the line segment XY.
(b) the mid-point of the line segment XY.
(c) the gradient of the line segment XY.
(d) the equation of the perpendicular bisector of the line segment XY. [9]

16.



The solid figure $PQRSTU$ above, represents a wooden wedge. $TU = 6$ cm, $UP = 9$ cm, and $PQ = 15$ cm. SR and TU are perpendicular to the plane $PQRU$.

Calculate:

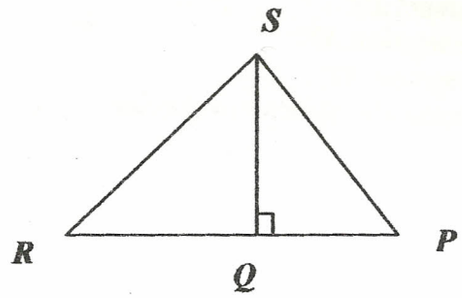
(i) the length of PT in centimetres [2]
(ii) the surface area of the wedge in square centimetres [5]
(iii) the size of angle TPU. [2]

17. The heights of a group of students in Form 3 are shown in the table below.

Height (*cm*)	Frequency (*f*)
150 - 154	11
155 – 159	11
160 – 164	13
165 – 169	9
170 - 174	6

(i) How many students are in the group?
(ii) State the modal class.
(iii) By finding the mid-interval value, calculate the mean height of the students.
(iv) Calculate the probability that a student chosen at random is AT LEAST 164.5 *cm* tall. [9]

18. Two lighthouses, ***P*** and ***R***, and a telecommunications antenna with base ***Q*** and top ***S*** are illustrated below.



The angles of depression of the lighthouses ***P*** and ***R*** from the antenna are 60^0 and 45^0 respectively.

(i) Copy the diagram and insert the angles of depression. [3]
(ii) If the antenna is 150 m high, find the distance between the lighthouses. [4]

End of Examination