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PC4022
WASSCE 2018
MATHEMATICS
(CORE) 2
2½ hours

2

Name.....

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THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination for Private Candidates

PC 2018

MATHEMATICS (CORE) 2
[100 marks]

2½ hours

Write your name and index number in ink in the spaces provided above.

Answer ten questions in all. All the questions in Section A and five questions from Section B.

In each question, all necessary details of working, including rough work, must be shown with the answer.

Give answers as accurately as data and tables allow.

Graph papers are provided for your use in the examination.

The use of non-programmable, silent and cordless calculator is allowed.

Answer all the questions in this section. All questions carry equal marks.

1. Solve:

(a) $\frac{1}{2}(4x - 6) - \frac{1}{3}(5 - 4x) \geq 8.$

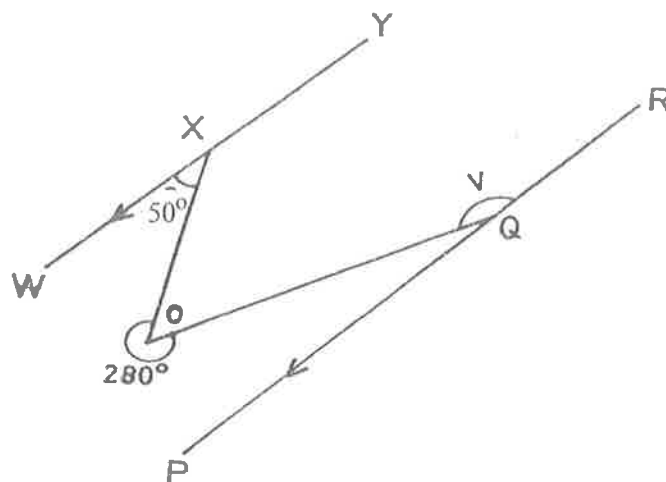
(b) the simultaneous equations:

$$\frac{3}{x} - \frac{4}{y} = \frac{1}{3},$$

$$\frac{2}{x} - \frac{5}{y} = 1.$$

2. (a) A woman spent $\frac{1}{6}$ of her monthly salary on foodstuffs, $\frac{1}{3}$ on drugs, $\frac{1}{4}$ on utility bills and had GH¢ 285.00 left. Calculate her monthly salary.

(b)



In the diagram, $WY \parallel PR$, $\angle WOX = 50^\circ$, reflex $\angle XOQ = 280^\circ$ and $\angle OQR = V$.
Find the value of V .

3. From two points P and Q , 15 m apart and on the same horizontal line as the foot of a tower, the angles of elevation of the top of the tower are 35° and 45° , respectively. If P and Q are on the same side of the tower,

- (a) represent the information in a diagram;
(b) find, correct to the nearest metre, the height of the tower.

4. (a) The area of a sector of a circle of radius 12 cm, is 132 cm^2 . If the sector is folded such that its straight edges coincide to form a cone, find the radius of the base of the cone.
[Take $\pi = \frac{22}{7}$]

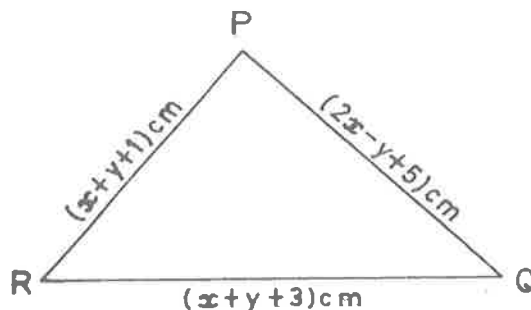
- (b) A circle centre O has radius 5 cm. A chord PQ of the circle is 6 cm long. Calculate:
(i) the distance of the chord from the centre O ;
(ii) angle POQ .

5. The probabilities that Ade, Kofi and Fati will pass an examination are $\frac{2}{3}$, $\frac{5}{8}$ and $\frac{3}{4}$, respectively. Find the probability that:
- the **three** of them will pass the examination.
 - none** of them will pass the examination.
 - Ade and Kofi **only** will pass the examination.

SECTION B
[60 marks]

Answer **five** questions **only** from this section. All questions carry **equal** marks.

6. (a) A housing estate consists of 100 houses **each** rented at GH¢ 150.00 per month and 108 flats **each** rented at GH¢ 110.00 per month. If all were rented out in a year,
- find the total annual rent collected;
 - calculate the half year tax, if income tax paid on rent is 8 % per annum.
- (b) Two cyclists Musa and Amandu left point P at the same time in opposite directions. If their speeds are 8 km/h and 12 km/h respectively;
- how long will it take them to be 40 km apart?
 - calculate the distance covered by Musa within the time in $b(i)$.
7. (a) Solve the equation: $\frac{2x+3}{x-1} = \frac{5x-3}{3-x}$.
- (b)



In the diagram, RQ is the base of the isosceles triangle PQR . If the perimeter of the triangle is 20 cm, find the values of x and y .

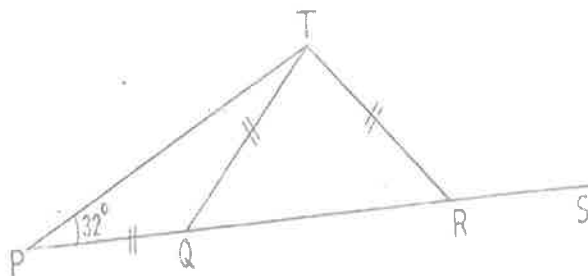
8. (a) Draw the table of values for $y = 3 - 2\cos x$, $0^\circ \leq x \leq 360^\circ$ using intervals of 60° .
- (b) Using scales of 2 cm to 60° on the x -axis and 2 cm to 1 unit on the y -axis, draw the graph of $y = 3 - 2\cos x$, for $0^\circ \leq x \leq 360^\circ$.
- (c) Use the graph to find the:
- maximum point of the graph;
 - values of x for which $\cos x = 0.25$.

9. The table shows the frequency distribution of marks scored by 100 candidates in an examination.

Marks (%)	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	90 – 99
Frequency	2	7	8	13	24	30	6	5	3	2

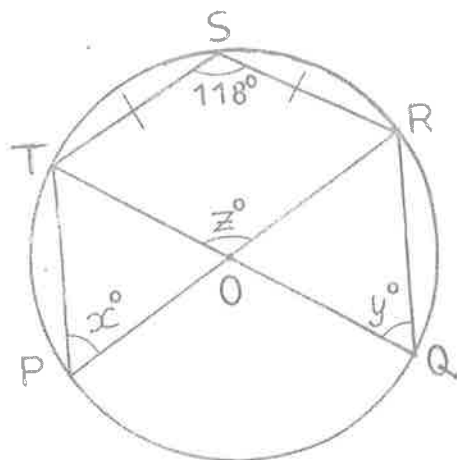
- (a) Construct a cumulative frequency table.
- (b) Draw a cumulative frequency curve.
- (c) Use the curve to estimate the:
- percentage of candidates who passed the examination, if the pass mark is 45.5 %;
 - lowest** mark for a scholarship if the **best** 5 % of the candidates qualified for the scholarship.
10. The area of a rectangular farmland is $7,200 \text{ m}^2$ while its perimeter is 360 m. Calculate, the:
- dimensions of the farmland;
 - cost of clearing the farmland at ~~N~~8.50 per square metre, leaving a margin of 2 m wide along the longer sides;
 - percentage of the farmland **not** cleared.
11. (a) Evaluate: $\int_1^3 \left(\frac{3 + x^3 + 2x^4}{x^2} \right) dx$.
- (b) Using the completing the square method, solve the equation: $4x^2 - 8x - 5 = 0$.
12. (a) **M**(3, 7) and **N**(15, -3) are two points in the coordinate plane. **P** is a point on **MN** such that $\mathbf{MP} = k\mathbf{MN}$. Find the coordinates of **P** when $k = -\frac{3}{2}$.
- (b) The point **P** has position vector $\begin{pmatrix} 100 \\ 0 \end{pmatrix}$ and $\mathbf{T} = \begin{pmatrix} 0.28 & 0.96 \\ 0.96 & -0.28 \end{pmatrix}$.
- Find the image **P'** of **P** under **T**.
 - Using 2 cm to 20 units on both axes, plot the position vectors of **P** and **P'**.
 - Draw a straight line **L**, bisecting the angle **P'OP**.
 - Measure $\angle \mathbf{P'OL}$.

13. (a)



In the diagram, $\angle TPQ = 32^\circ$ and $|PQ| = |QT| = |TR|$. Calculate $\angle TRS$.

(b)



In the diagram, O is the centre of the circle, $|TS| = |SR|$, $\angle TPR = x^\circ$, $\angle TQR = y^\circ$, $\angle TOR = z^\circ$ and $\angle TSR = 118^\circ$.

- (i) Find the relationship between x , y and z .
- (ii) Calculate $\angle STP$.

END OF PAPER