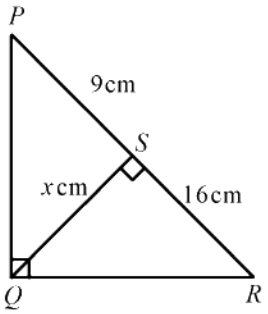
1. (a) Given that $\log_{10} x = \bar{1}.3010$ and $\log_{10} y = 1.6021$ find $\log_{10} \sqrt{\frac{x}{y}}$.

   (b) A man bought some shirts for GHC 720.00 If each shirt was GHC $\not\in$ 2.00 cheaper, he would have received 4 more shirts. Calculate the number of shirts bought.

2. (a) If $\sin 30^\circ = \frac{1}{2}, \cos 45^\circ = \frac{1}{\sqrt{2}}$ and $\tan 60^\circ = \sqrt{3}$, without using Mathematical tables or calculator, simplify $\frac{\sin 30^\circ + \cos 45^\circ}{\tan 60^\circ}$.

   (b) Three interior angles of a polygon are 160° each. If the other interior angles are 120° each, find the number of sides of the polygon.

3. 

   In the diagram, $\angle PQR = \angle PSQ = 90^\circ$ $|PS| = 9$cm, $|SR| = 16$cm, and $|SQ| = x$cm Find:

   (a) the value of x.

   (b) $\angle QRS$, correct to the nearest degree.

   (c) $|PQ|$.

4. (a) A trader purchased 10 dozen eggs at ₦300.00 per dozen. On getting to his shop, he found that 20 eggs were broken. How much did he sell the remaining eggs if he made a profit of 10%.

   (b) Thirty-five coloured balls were shared among four teams such that one team takes all the red balls. If the remainder is shared to the other teams in the ratio 4: 3: 2 and the smallest share was 6 balls, how many red balls were there?

5. (a) The probabilities that Mensah will pass Mathematics and an Economics tests are $\frac{3}{4}$ and $\frac{5}{8}$ respectively. If the probability that he passes at least one of the subjects is $\frac{7}{12}$, what is the probability that he passes both subjects?

   (b) ln a class of 30 students, 25 offer Biology, 21 offer Physics and each student offers at least one of the subjects. If a prefect is selected from the class. what is the probability that she offers one subject only.

6. A publisher prints 30,000 copies of a book at GHC 2.00 each and sold them for GHC 2.76 each. The publisher agrees to pay 10% of the selling price for the first 6,000 copies sold and $12\frac{1}{2}\%$ of the selling price for all copies sold in excess of 6, 000. If 25,380 copies of the book were sold,

   (a) calculate, correct to the nearest Ghana Cedi, the:

      i. total amount received by the author;

      ii. net profit the publisher makes after he has paid the author.

(b) find, correct to one decimal place, the publisher's net profit as a percentage of the author's total receipt.

7. A bag of food aid is released from an aeroplane when it is 1000m above a military camp. The height h metres, of the bag above the camp at time t seconds is given by the $h = 100 - 5t^2$ relation

(a) Copy and complete the following table for the relation $h = 100 - 5t^2$

$t(s)$	0	1	3	5	7	9	11	13	15
h(m)				875			395		

(b) Using a scale of 2cm to 2 seconds on the $t-$ axis and 2cm to 1000m on the $h-$ axis, draw a graph of the relation $h = 100 - 5t^2$ for $0 \leq t \leq 15$.

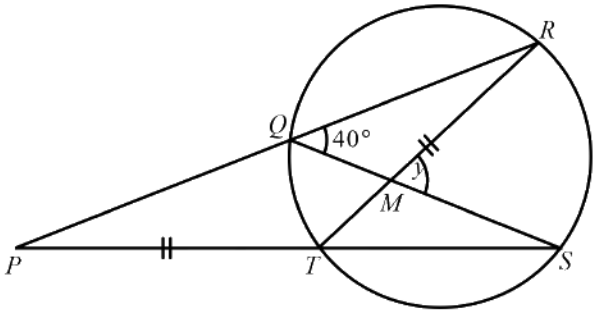
(c) Use the graph to find, correct to one decimal place, the:

i. time the bag takes to reach the ground

ii. time the bag takes to drop through the first 650m

iii. height of the bag above the camp after falling for 7.5 seconds.

8. (a)



In the diagram, $\angle RQS = 40°$, $|RT| = |PT|$ and $\angle RMS = y$. Find the value of y

(b) XY is a tangent to a circle LMN at the point M. XLN is a straight line. $\angle NXM = 34°$ and $\angle NMY = 65°$

i. Illustrate the information in a diagram.

ii. Find the value of:

i. $\angle MLX$

ii. $\angle LNM$

9. (a) If $T = WP\left[M^2 - (M - S)^2\right]$, express M in terms of T, W, P and S.

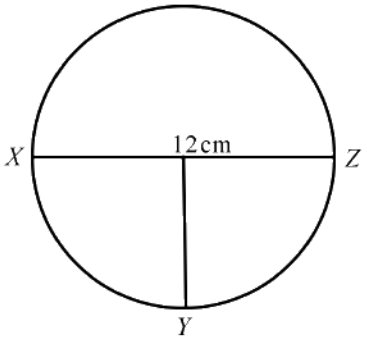
(b) A point X is between two towers TP and QW and are all on the same horizontal ground. The angles of elevation of the tops T and Q from X are $62°$ and $48°$ respectively. $TP =$ 100m and $PW = 80$m

i. Illustrate the information in a diagram.

ii. Calculate, correct to the nearest metre, $|QW|$.

10. (a) If $(x - 1)\log_{10} 4 = x \log_{10} 16$, without using Mathematical tables or calculator, find the value of x.

(b)



In the diagram, XZ is a chord which is 12cm long. If the perpendicular distance from the midpoint of the chord to a point Y on the circumference of the circle is 4cm, calculate, correct to one decimal place, the perimeter of the sector $OYZY$ [Take $\pi = \frac{22}{7}$]

11. The distribution of marks scored by some students in a test is as follows:

Marks	1	2	3	4	5
Number of students	$p+2$	$p-1$	$2p-3$	$p+4$	$3p+4$

(a) If the mean mark is $3\frac{5}{22}$, find the value of p.

(b) Find the:

i. interquartile range.

ii. probability of selecting a student who scored at least 4 marks in the test.

12. (a) The operation $*$ is defined on the set of real numbers, $\mathbf{R}$ by: $x * y = \frac{x+y}{2}, x, y \in \mathbf{R}$.

i. Evaluate $3 * \frac{2}{5}$

ii. If $8 * y = 8\frac{1}{4}$, find the value of y.

(b) In ΔABC, $\overrightarrow{AB} = \begin{pmatrix} -4 \\ 6 \end{pmatrix}$ and $\overrightarrow{AC} = \begin{pmatrix} 3 \\ -8 \end{pmatrix}$. If P is the midpoint of $\overrightarrow{AB}$, express $\overrightarrow{CP}$ as a column vector.

13. (a) Using the completing the square method, solve, correct to two decimal places, the equation $3y^2 - 5y + 2 = 0$.

(b) Given that $\mathbf{M} = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$, $\mathbf{N} = \begin{pmatrix} m & x \\ n & y \end{pmatrix}$ and $\mathbf{MN} = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$, find the matrix $\mathbf{N}$.