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Grade 10 Maths Exam Paper 2 11 November 2013

Marks: 100 Time: 2 hours Examiner: Mrs Selkirk

Instructions

1. Work clearly and neatly. Start each question at the top of a new side of a page..
2. **Hand in answers and question paper separately.**
3. Show all working out.
4. Non – programmable calculators may be used unless the question states that you may not use one.
5. Round all answers off to 2 decimal places, where necessary.

Question1 (7 marks)

The data below represents the number of hours of television watched per day during the school holiday by a sample of 9 Grade 10 learners.

2 4 1 5 9 2 4 3 2

1.1 Find the five number summary for this set of data. (4)

1.2 Use the five number summary to draw a box and whisker diagram for this data. (2)

1.3 Find the interquartile range for this set of data. (1) [7]

Question 2 (9marks)

The following data represents the distance in kilometres that a sample of 25 Grade 10 learners travels to school each day.

Distance in km	f	Midpoint (X)	f.X
$0 < x \leq 10$	11		
$10 < x \leq 20$	7		
$20 < x \leq 30$	5		
$30 < x \leq 40$	2		

2.1 What is the modal class? (1)

2.2 Complete the table, a copy of which is on **Diagram Sheet A** (2)

2.3 Use the table to calculate the approximate mean for this set of data. (2)

2.4 What percentage of the learners lives within a 20 km radius of the school? (2)

2.5 In which interval will the 65th percentile be found? (2) [9]

Question 3 ((3 marks)

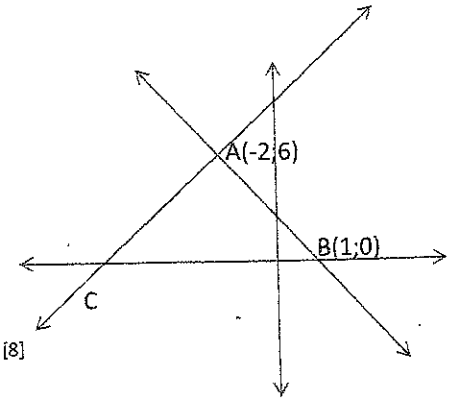
The following terms represent 5 different data values.

$$2x \quad x+3 \quad x-1 \quad 2x-3 \quad x+5$$

The mean for the data set is 12. Determine the value of x. [3]

Question 4 (8 marks)

In the accompanying diagram, lines AB and AC are perpendicular to each other.



4.1 Find the coordinates of D, the midpoint of AB. (2)

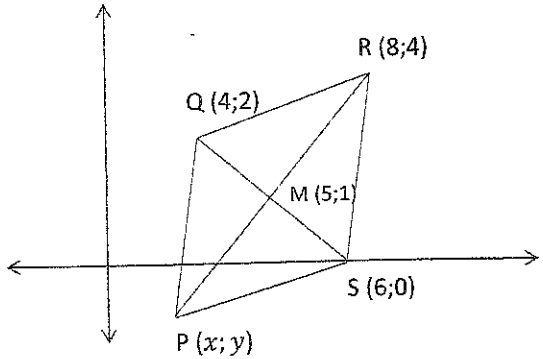
4.2 Find the equations of lines

4.2.1 AB (3)

4.2.2 AC (3) [8]

Question 5 (9 marks)

Parallelogram PQRS with vertices P $(x; y)$, Q (4;2), R (8;4) and S (6;0) is drawn on the Cartesian Plane below. Diagonals QS and RP are drawn.



5.1 Determine the coordinates of P. (2)

5.2 Show that points Q, M and S are collinear by using analytical methods. (3)

5.3 Show that PQRS is a rhombus. (4) [9]

Question 6 (3 marks)

Given P (x; 5), Q (-3;2), R (2;5) and S (-1;4), find the value of x if PQ $\perp$ RS. [3]

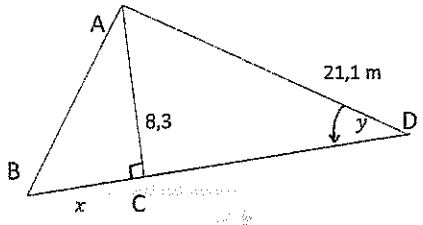
Question 7 (19 marks)

7.1 If 5 $tan\theta = 12$ and $90° < \theta < 360°$, determine the value of cos θ by using a diagram and without using a calculator. (4)

7.2.1 Sketch the special diagram used to evaluate trigonometric ratios of 60° without a calculator. (1)

7.2.2 Use the diagram to evaluate $\frac{1}{\sin 60°}$ without using a calculator. (2)

7.3 In the diagram below, $B\hat{A}C = 45°$, ~~BC~~ AC = 8,3 m, AC $\perp$ BD and AD = 21,1 m.



Use the diagram above to calculate the size of

7.3.1 x (2)

7.3.2 y (2)

7.4 If cos 15° = t, use a diagram to determine cos 75° (3)

7.5 Solve for x if $x \in (0; 90°)$

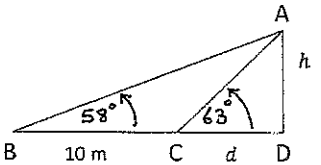
7.5.1 $2\tan x - 5{,}8 = 0$ (2)

7.5.2 $4\sin x - 3 = \cos 32°$ (3)

[19]

Question 8 (9 marks) 63°

The angle of elevation from B to the top of flagpole AD is 58°. An observer walks 10 m from B to C and finds the angle of elevation of A to be ~~73°~~. Let the height of the flagpole be h meters and the distance between the flagpole and the second point of observation, C, be d meters.



8.1 Express h in terms of d and a ratio of 63°. (2)

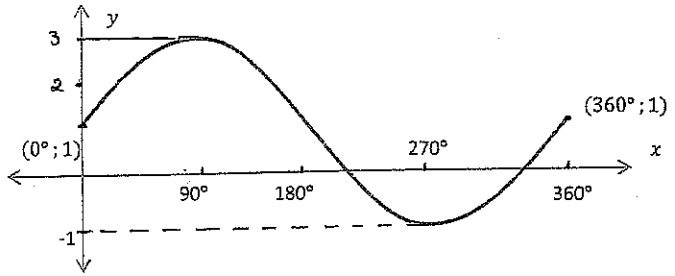
8.2 Express h in terms of d and a ratio of 58°. (1)

8.3 Use your answers to 8.1 and 8.2 to show that $d = 44{,}17$ m. (4)

8.4 What is the height of the flagpole? (2) [9]

Question 9 (5 marks)

9.1 Sketched below is the graph of $f(x) = a\sin x + b$ for $x \in [0°; 360°]$



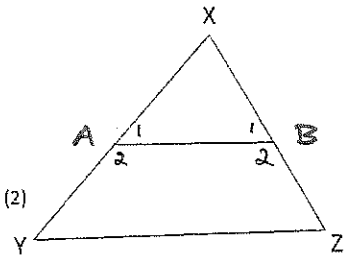
Write down the values of: 9.1.1 a (1)

9.1.2 b (1)

9.2 Sketch the graph of $g(x) = -\tan x$ for $x \in [0°; 180°]$ **on the set of axes provided on Diagram Sheet A.** (3) [5]

Question 10 (6 marks)

In the diagram below, $\hat{A}_1 = 50°$ and $\hat{Y} = 50°$



10.1 Prove AB ll YZ (1)

10.2 Show that ΔXAB lll ΔXYZ (3)

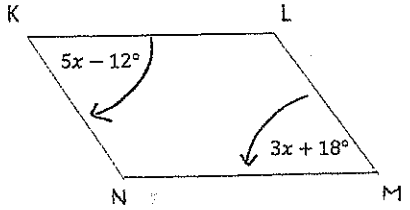
10.3 Hence, if XB = 2,5 ; XZ = 7,5 and YZ = 5,4 , calculate AB. (2)

[6]

Question 11 (16 marks)

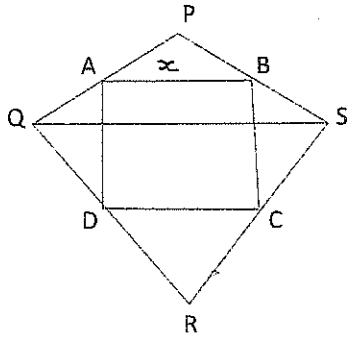
For each sub - question in this question, there is a separate diagram. Be careful to use the correct diagram for the question you are answering.

11.1 Determine the size of the interior angles in parallelogram KLMN with reasons. (3)

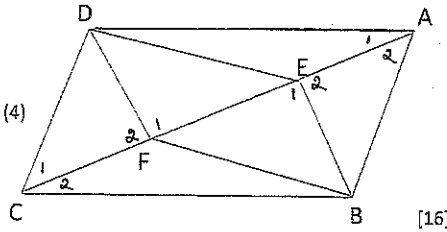


11.2 PQRS is a kite. A and B are the midpoints of PQ and PS respectively. QD = DR and SC = CR.

Let AB = x. Prove ABCD is a parallelogram. (5)



11.3 ABCD is a parallelogram. BE ⊥ AC and DF ⊥ AC.



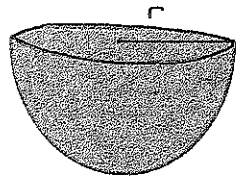
11.3.1 Prove Δ FDC ≡ Δ EBA (4)

11.3.2 Prove EBFD is a parallelogram. (4)

[16]

Question 12 (6 marks)

Consider the solid hemisphere below. It has a radius of 4 cm. Calculate to 2 decimal places, the:



12.1 Volume (2)

12.2 Surface area of the solid. (3)

12.3 If the radius is doubled, what would be the ratio of the volume of the original sphere to the volume of the new sphere? (1)

[6]

TOTAL: 100 marks

Diagram Sheet A

Question 2.2

Distance in km	f	Midpoint (X)	f.X
$0 < x \leqslant 10$	11		
$10 < x \leqslant 20$	7		
$20 < x \leqslant 30$	5		
$30 < x \leqslant 40$	2		

(2)

2.3 _____

_____

_____

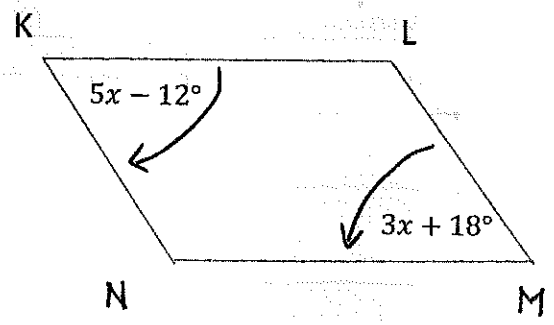
_____ (2)

Diagram Sheet A

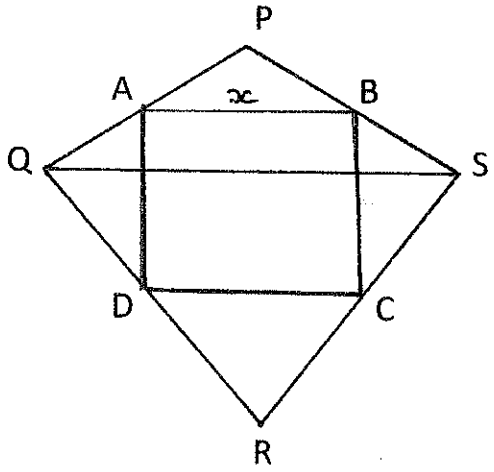
Question 9.2

(3)

Question 11.1



Question 11.2



Question 11.3