



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 10**

**MATHEMATICS P2**

**NOVEMBER 2017**

**MARKS: 100**

**TIME: 2 hours**

**This question paper consists of 10 pages and a 15-page answer book.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. Round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You must use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. Write neatly and legibly.

**QUESTION 1**

The data below shows the number of laptops sold by 15 sales agents during the last financial year.

43   48   62   52   46   90   58   37   48   73   84   68   54   34   78

- 1.1 Determine the median of the number of laptops sold. (2)
  - 1.2 Calculate the range of the data. (2)
  - 1.3 Calculate the interquartile range (IQR). (3)
  - 1.4 Draw a box and whisker diagram for the data above. (3)
- [10]**

**QUESTION 2**

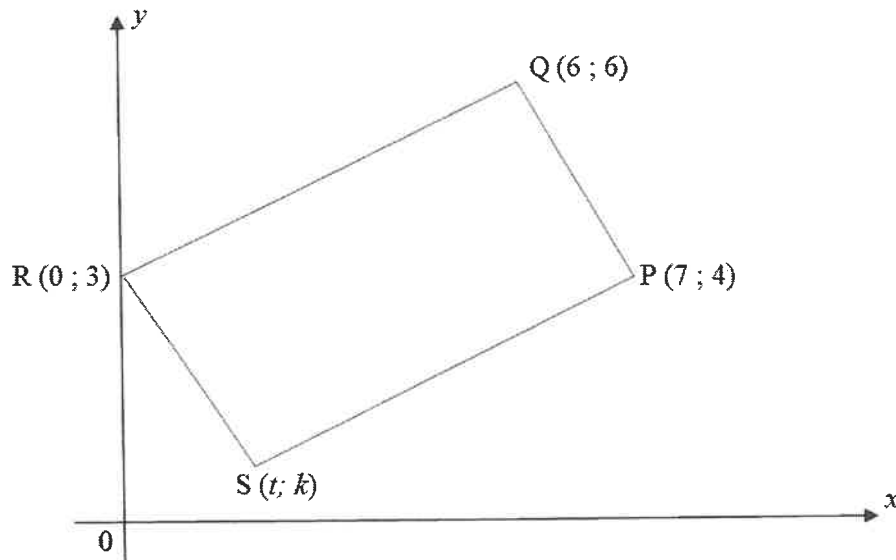
A learner did a project on climate change. At 14:00 each day, she recorded the temperature (in °C) for a certain town. The information is given in the frequency table below.

TEMPERATURE (IN °C)	FREQUENCY
$20 \leq T < 24$	2
$24 \leq T < 28$	4
$28 \leq T < 32$	9
$32 \leq T < 36$	5
$36 \leq T < 40$	7
$40 \leq T < 44$	3

- 2.1 For how many days did the learner collect the data? (1)
  - 2.2 Write down the modal class for the data. (1)
  - 2.3 Estimate the mean of the data. (3)
  - 2.4 Calculate the percentage of days on which the temperature was at least 28 °C. (2)
- [7]**

**QUESTION 3**

In the diagram below,  $P(7 ; 4)$ ,  $Q(6 ; 6)$ ,  $R(0 ; 3)$  and  $S(t ; k)$  are the vertices of quadrilateral PQRS.



- 3.1 Calculate the length of PQ. Leave your answer in surd form. (2)
- 3.2 If  $T\left(\frac{7}{2}; \frac{7}{2}\right)$  is the midpoint of QS, determine the coordinates of S. (3)
- 3.3 If the coordinates of S are (1 ; 1), show that  $PR = QS$ . (2)
- 3.4 Show that  $QR \perp RS$ . (4)
- 3.5 Hence, what type of special quadrilateral is PQRS? Motivate your answer. (2)
- 3.6 Calculate the size of  $\hat{RSQ}$ . (3)

**[16]**

**QUESTION 4**

4.1 Given  $4 \cot \theta + 3 = 0$  and  $0^\circ < \theta < 180^\circ$ .

4.1.1 Use a sketch to determine the value of the following. DO NOT use a calculator.

(a)  $\cos \theta$  (4)

(b)  $\frac{3 \sin \theta \sec \theta}{\tan \theta}$  (4)

4.1.2 Hence, show that  $\sin^2 \theta - 1 = -\cos^2 \theta$ . (3)

4.2 Simplify the following expression WITHOUT using a calculator:

$$\cos 30^\circ \tan 60^\circ + \operatorname{cosec}^2 45^\circ \sin^2 60^\circ$$
 (3)

4.3 Solve for  $\theta$  correct to TWO decimal places, if

$$\frac{4}{3} \sin \theta = \cos 37^\circ \text{ and } 0^\circ \leq \theta \leq 90^\circ.$$
 (2)  
[16]

**QUESTION 5**

Given  $f(x) = \sin x - 1$  and  $g(x) = 2 \cos x$  for  $0^\circ \leq x \leq 270^\circ$ .

5.1 Sketch, on the grid provided in the ANSWER BOOK, the graph of  $f$  and  $g$  for  $0^\circ \leq x \leq 270^\circ$ . (6)

5.2 Write down the following:

5.2.1 Amplitude of  $g$  (1)

5.2.2 Range of  $f$  (2)

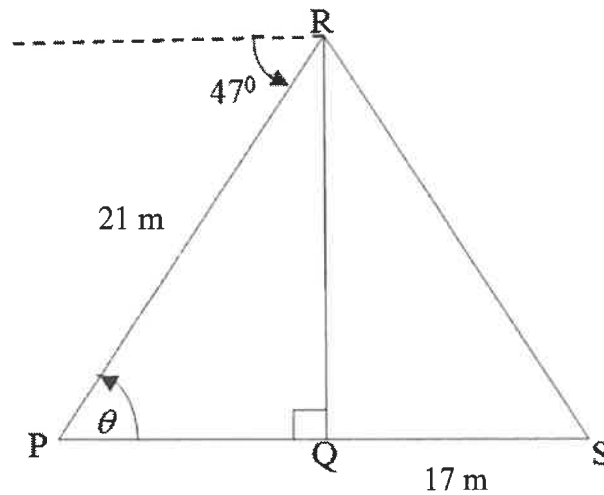
5.3 Use your graph to determine the following:

5.3.1 Number of solutions to  $f(x) = g(x)$  in the interval  $0^\circ \leq x \leq 270^\circ$  (1)

5.3.2 Value(s) of  $x$  in the interval  $0^\circ \leq x \leq 180^\circ$  for which  $\sin x = 2 + 2 \cos x$  (3)  
[13]

**QUESTION 6**

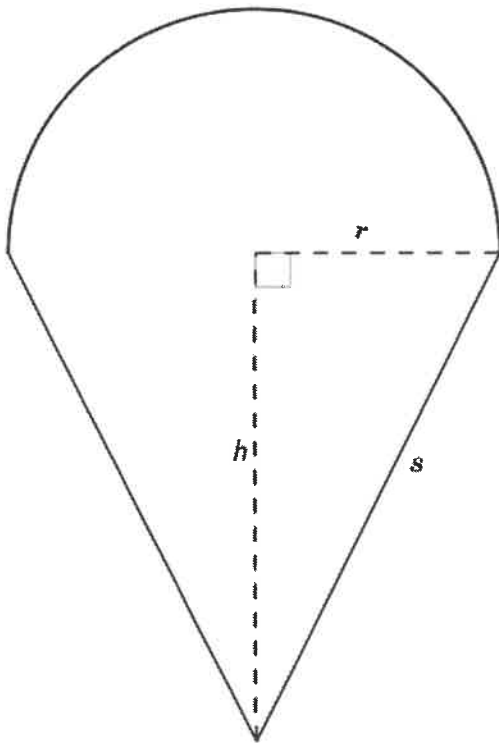
RQ is a vertical pole. The foot of the pole, Q, is on the same horizontal plane as P and S. The pole is anchored with wire cables RS and RP. The angle of depression from the top of the pole to point P is  $47^\circ$ . PR is 21 m and QS is 17 m.  $\hat{RPQ} = \theta$ .



- 6.1 Write down the size of  $\theta$ . (1)
- 6.2 Calculate the length of RQ. (3)
- 6.3 Hence, calculate the size of  $\hat{S}$ . (2)
- 6.4 If P, Q and S lie in a straight line, how far apart are the anchors of the wire cables? (4)
- [10]**

**QUESTION 7**

The diagram below shows the cross-section of a solid made up of a hemisphere placed on top of a right circular cone with radius  $r$  and slant height  $s$ . The perpendicular height of the cone,  $h$ , is 6,5 cm and the volume of the cone is  $83,38 \text{ cm}^3$ .

**Formulae:**

$$\text{Surface area of sphere} = 4\pi r^2$$

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of cone} = \pi r^2 + \pi r s$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

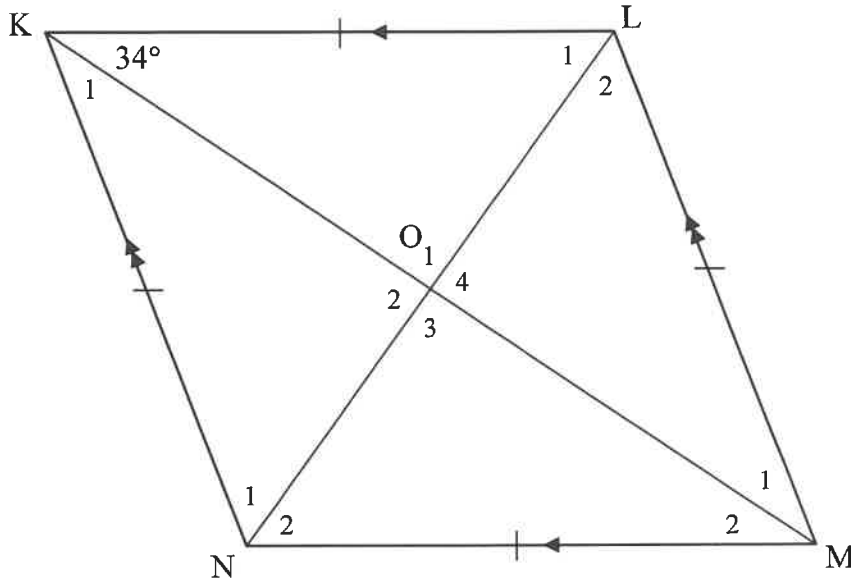
Calculate, correct to TWO decimal places:

- 7.1 The radius,  $r$ , of the cone (2)
- 7.2 The slant height,  $s$ , of the cone (2)
- 7.3 The surface area of the solid (2)
- [6]**

Give reasons for ALL statements in QUESTIONS 8 and 9.

**QUESTION 8**

8.1 KLMN is a rhombus with diagonals intersecting at O.  $\hat{LKM} = 34^\circ$ .

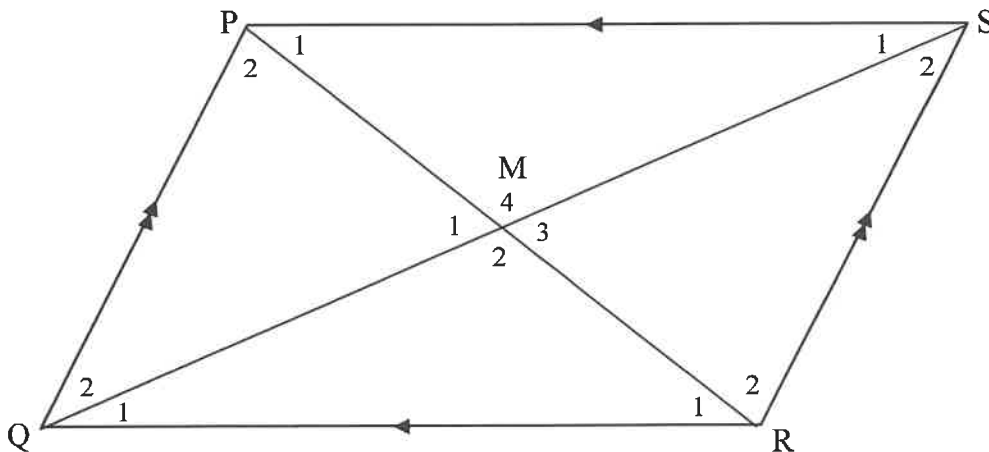


8.1.1 Write down the size of  $\hat{O}_1$ . (1)

8.1.2 Calculate the size of  $\hat{L}_1$ . (2)

8.1.3 Calculate the size of  $\hat{KNM}$ . (2)

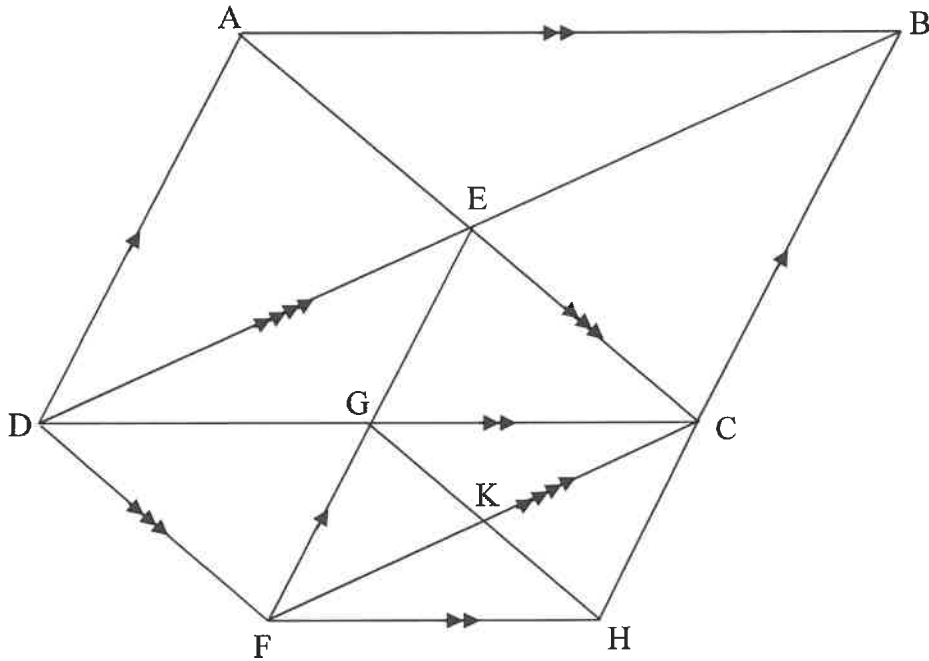
8.2 Given parallelogram PQRS with diagonals PR and QS intersecting at M.



Prove that the diagonals bisect each other. (4)



- 8.3 In the diagram, ABCD is a parallelogram with diagonals intersecting at E. The diagonals of parallelogram DECF intersect at G. The diagonals of parallelogram FGCH intersect at K.

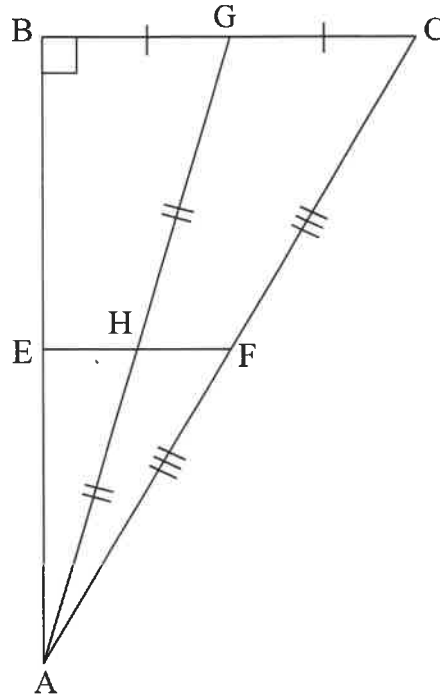


Prove that  $DB = 4KC$ .

(4)  
[13]

**QUESTION 9**

$\triangle ABC$  is right-angled at B. F and G are the midpoints of AC and BC respectively. H is the midpoint of AG. E lies on AB such that FHE is a straight line.



- 9.1 Prove that E is the midpoint of AB. (3)
- 9.2 If  $EH = 3,5 \text{ cm}$  and the area of  $\triangle AEH = 9,5 \text{ cm}^2$ , calculate the length of AB. (3)
- 9.3 Hence, calculate the area of  $\triangle ABC$ . (3)

[9]

**TOTAL: 100**