



# basic education

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

## NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS P2

NOVEMBER 2018

MARKS: 100

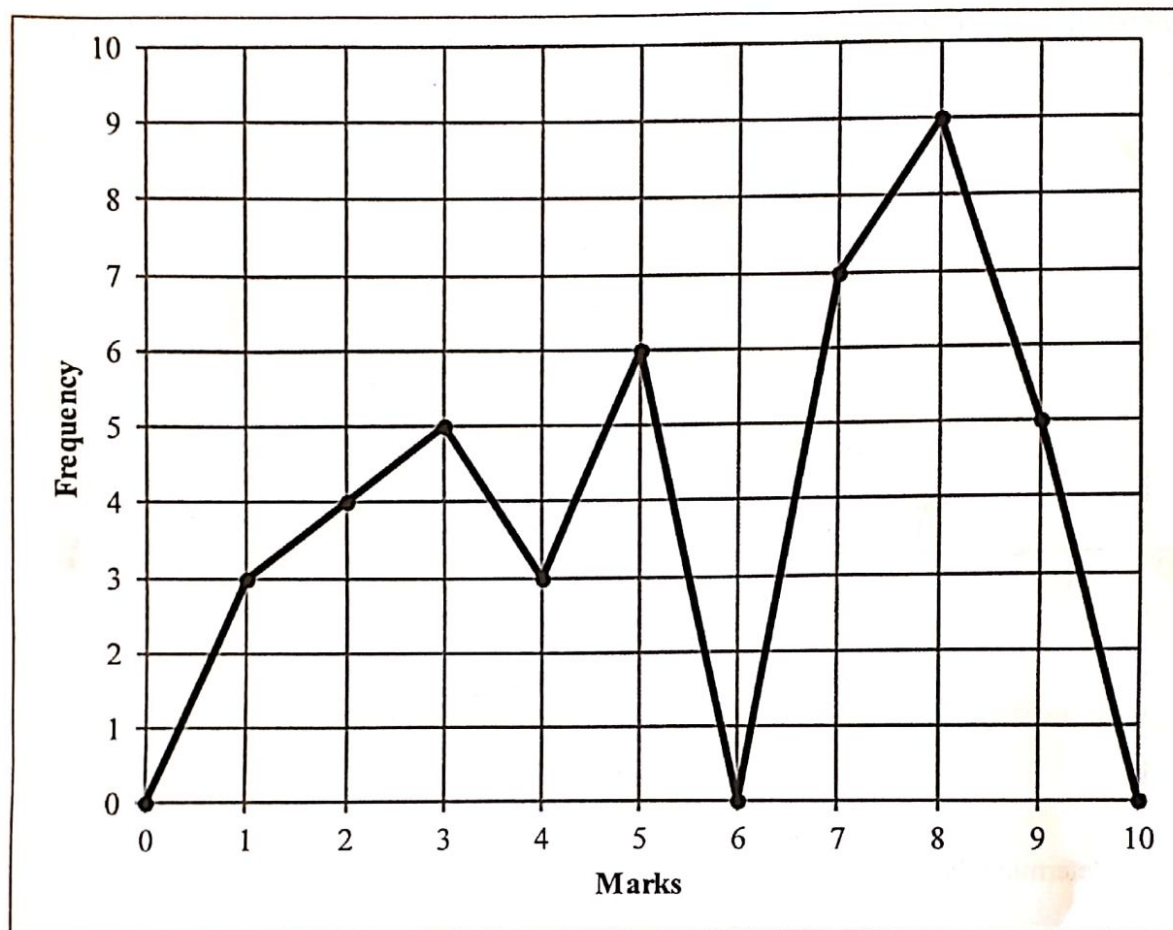
TIME: 2 hours

This question paper consists of 9 pages and a 12-page answer book.



**QUESTION 1**

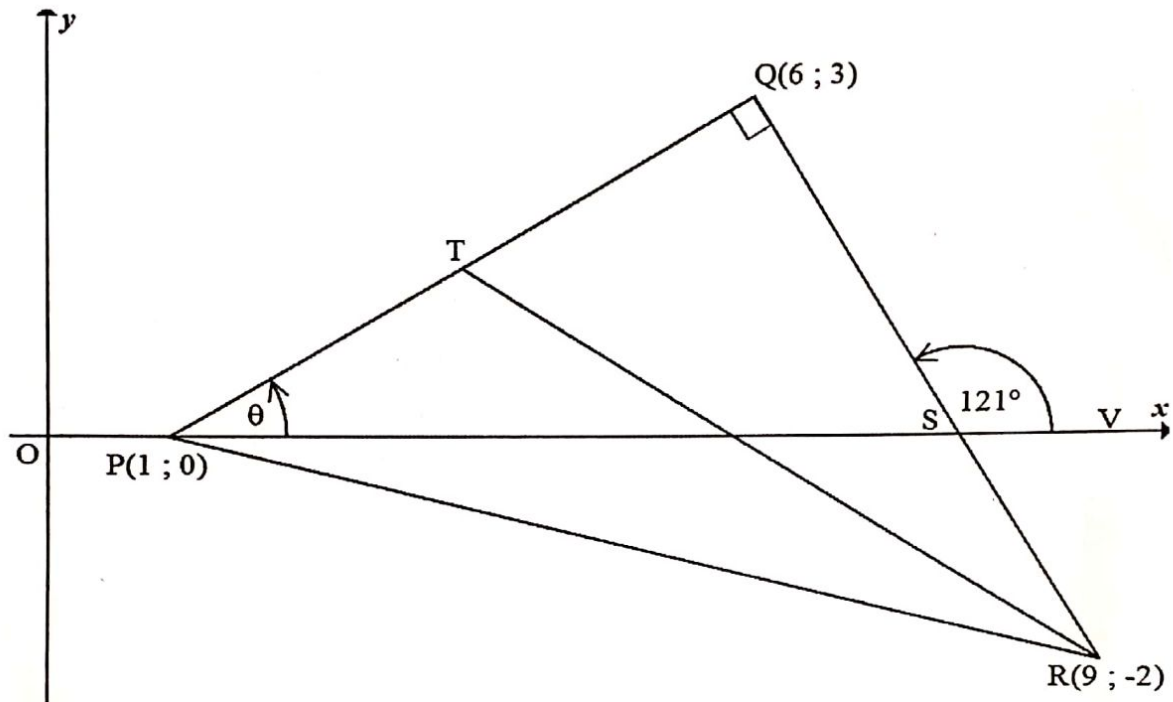
The line graph below shows test marks out of 10 obtained by a Grade 10 class.



- 1.1 Complete the frequency column in the table provided in the ANSWER BOOK. (2)
  - 1.2 How many learners wrote the test? (1)
  - 1.3 Calculate the:
    - 1.3.1 Range for the data (2)
    - 1.3.2 Mean for the test (3)
  - 1.4 Determine the median for the data. (3)
  - 1.5 Draw a box and whisker diagram for the data. (3)
- [14]**

**QUESTION 2**

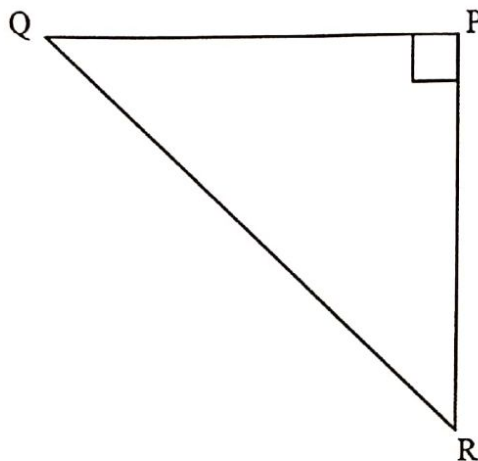
In the diagram below,  $P(1; 0)$ ,  $Q(6; 3)$  and  $R(9; -2)$  are the vertices of a triangle such that  $PQ = QR$  and  $PQ \perp QR$ .  $T$  is a point on  $PQ$  such that  $T$  is the midpoint of  $PQ$ .  $S$  is the point of intersection of  $RQ$  and the  $x$ -axis.  $V$  is a point on the  $x$ -axis such that  $\hat{QSV} = 121^\circ$ .  $\hat{QPS} = \theta$



- 2.1 Determine the:
- 2.1.1 Length of  $PQ$ . Leave your answer in surd form. (2)
  - 2.1.2 Gradient of  $PQ$  (2)
  - 2.1.3 Coordinates of  $T$  (2)
- 2.2 Calculate the:
- 2.2.1 Area of  $\triangle QTR$  (3)
  - 2.2.2 Size of  $\theta$ , with reasons (2)
  - 2.2.3 Coordinates of  $S$  (3)
- 2.3 Determine, with reasons, the gradient of the line through  $T$  and the midpoint of  $PR$ . (3)
- [17]**

**QUESTION 3**

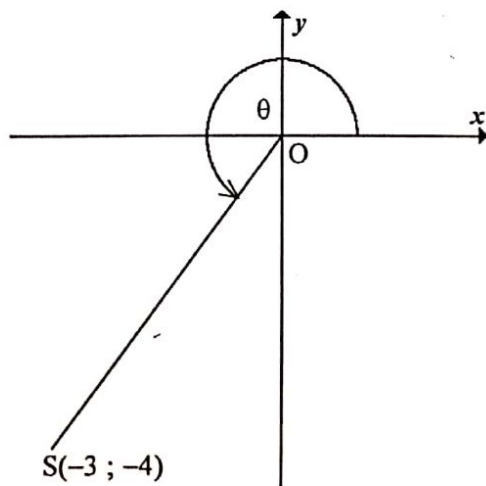
- 3.1 In the diagram below,  $\triangle QPR$  is a right-angled triangle with  $\hat{Q}PR = 90^\circ$ .



- 3.1.1 Use the sketch to determine the ratio of  $\tan(90^\circ - R)$ . (1)

- 3.1.2 Write down the trigonometric ratio that is equal to  $\frac{QR}{QP}$ . (1)

- 3.2  $S(-3 ; -4)$  is a point on the Cartesian plane such that  $OS$  makes an angle of  $\theta$  with the positive  $x$ -axis.



Calculate the following WITHOUT using a calculator:

- 3.2.1 The length of  $OS$  (2)

- 3.2.2 The value of  $\sec \theta + \sin^2 \theta$  (3)

- 3.3 Determine the value of the following WITHOUT using a calculator:

$$\frac{\operatorname{cosec} 45^\circ}{\sin 90^\circ \cdot \tan 60^\circ} \quad (4)$$

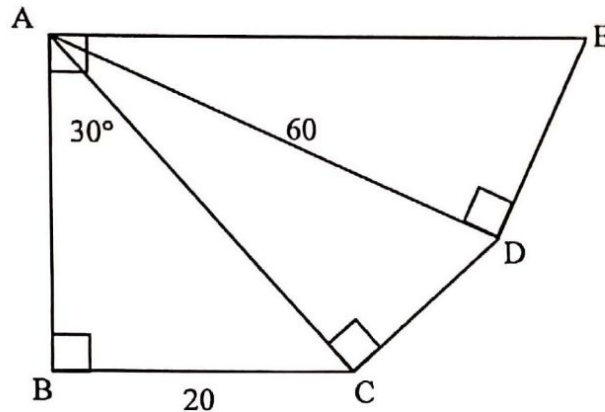
[11]





**QUESTION 4**

- 4.1 In the diagram below,  $\triangle ABC$ ,  $\triangle ACD$  and  $\triangle ADE$  are right-angled triangles.  
 $\angle BAE = 90^\circ$  and  $\angle BAC = 30^\circ$ .  $BC = 20$  units and  $AD = 60$  units.



Calculate the:

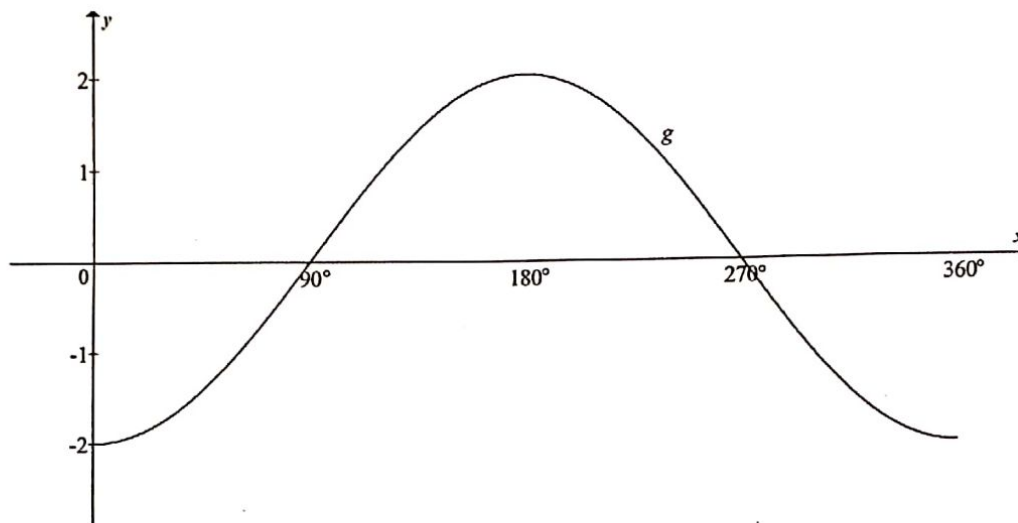
- 4.1.1 Length of  $AC$  (2)
- 4.1.2 Size of  $\angle CAD$  (2)
- 4.1.3 Length of  $DE$  (3)
- 4.2 Solve for  $x$ , correct to ONE decimal place, where  $0^\circ \leq x \leq 90^\circ$ :
- 4.2.1  $\tan x = 2,01$  (2)
- 4.2.2  $5 \cos x + 2 = 4$  (3)
- 4.2.3  $\frac{\operatorname{cosec} x}{2} = 3$  (3)
- [15]

**QUESTION 5**

- 5.1 Consider the function  $f(x) = -3 \tan x$ .
- 5.1.1 Sketch, on the grid provided in the ANSWER BOOK, the graph of  $f$  for  $0^\circ \leq x \leq 360^\circ$ . Clearly show ALL the intercepts and asymptotes. (3)
- 5.1.2 Hence, or otherwise, write down the:
- (a) Period of  $f$  (1)
- (b) Equation of  $h$  if  $h$  is the reflection of  $f$  about the  $x$ -axis (1)



5.2 Sketched below is the graph of  $g(x) = a \cdot \cos b\theta$



5.2.1 Write down the values of  $a$  and  $b$ . (2)

5.2.2 Use the graph to determine the value(s) of  $x$  for which  $g(x) > 0$ . (1)

5.2.3 Determine the range of  $h$  if  $h$  is the image of  $g$  if  $g$  is shifted down TWO units. (2)

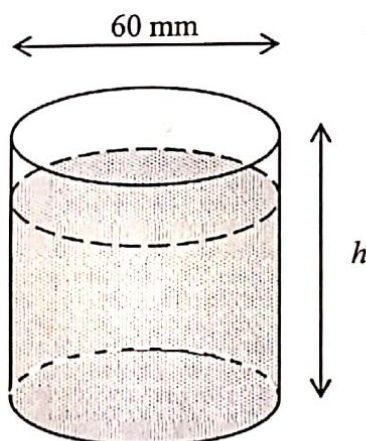
5.2.4 Determine, using the graph, the value of:

$$-2(\cos 0^\circ + \cos 1^\circ + \cos 2^\circ + \dots + \cos 358^\circ + \cos 359^\circ + \cos 360^\circ)$$

(2)  
[12]

### QUESTION 6

The diagram below shows a cup with a volume of  $117\pi \text{ cm}^3$  and an inner diameter of 60 mm. Ignore the thickness of the cup.



Calculate the:

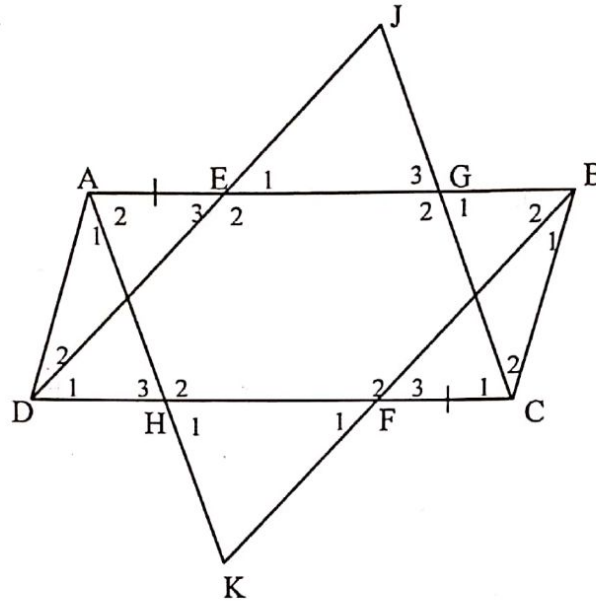
6.1 Height of the cup (3)

6.2 Total surface area of the water that touches the cup if the cup is 80% full with water (4)  
[7]



## QUESTION 8

- 8.1 ABCD is a parallelogram. E and F are points on AB and DC respectively such that  $AE = CF$ . DE is produced to J and CJ is drawn. BF is produced to K and AK is drawn.

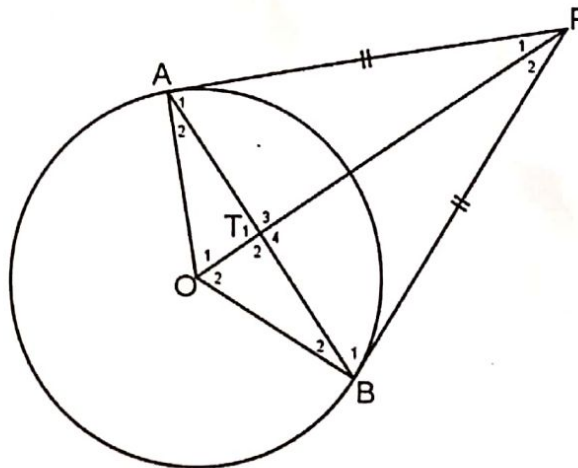


Prove that:

8.1.1  $DJ \parallel BK$  (5)

8.1.2  $\hat{E}_1 = \hat{F}_1$  (4)

- 8.2 In the diagram below O is the centre of the circle. A and B lie on the circumference of the circle.  $AP = BP$ .



Prove that:

8.2.1  $AT = BT$  (5)

8.2.2  $\hat{O}TA = 90^\circ$  (1)  
[15]

TOTAL: 100