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.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1.   This question paper consists of EIGHT questions.

2.   Answer ALL the questions in the SPECIAL ANSWER BOOK provided.

3.   Clearly show ALL calculations, diagrams, graphs, etc. that you used to determine the answers.

4.   Answers only will NOT necessarily be awarded full marks.

5.   If necessary, 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 line graph below shows test marks out of 10 obtained by a Grade 10 class.
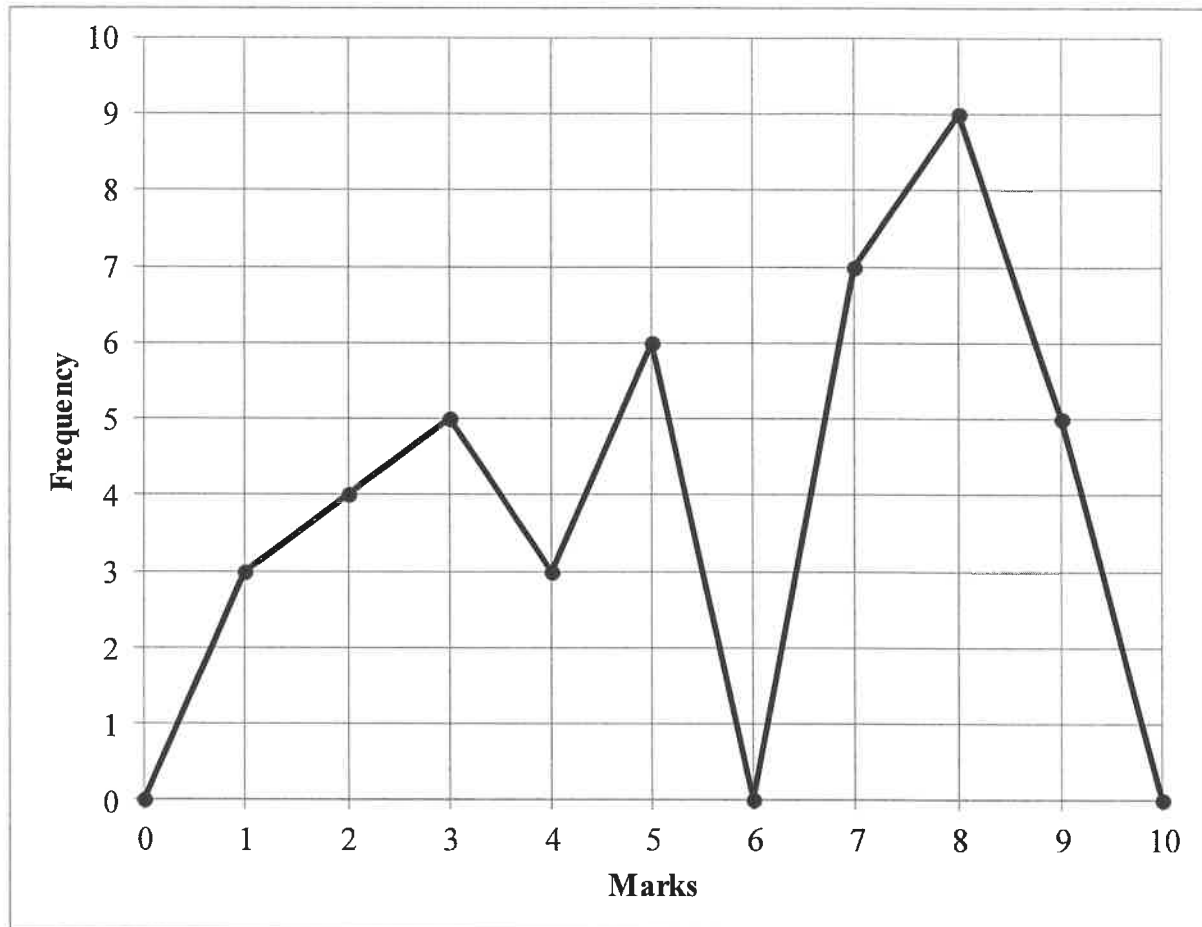
1.1   Complete the frequency column in the table provided in the ANSWER BOOK.   (2)

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 ⊥ 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 QŜV = 121°. QP̂S = θ
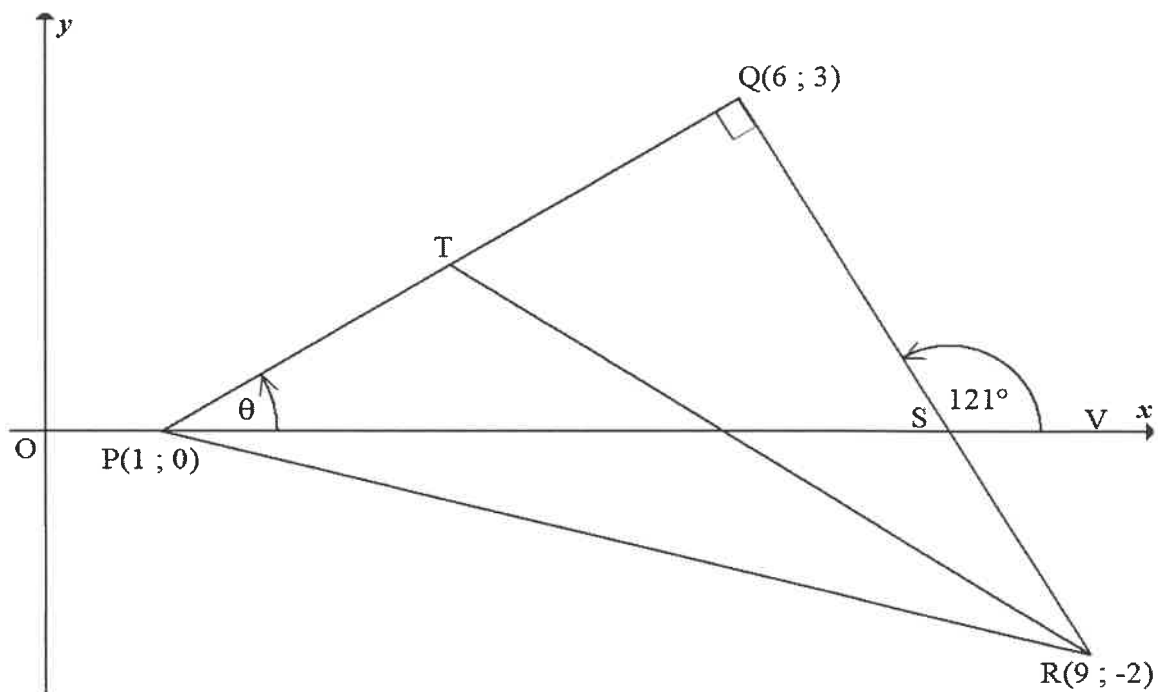
2.1   Determine the:

      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 ΔQTR   (3)

      2.2.2   Size of θ, 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 $Q\hat{P}R = 90°$.
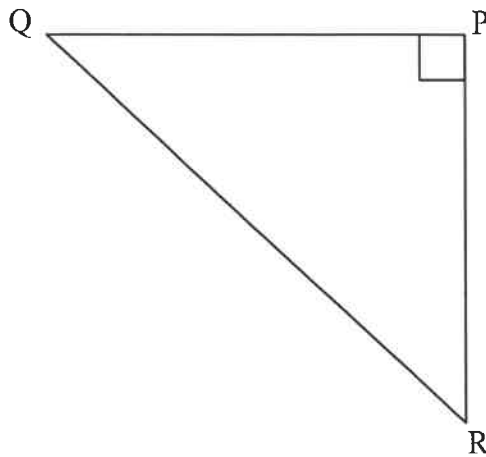
3.1.1 Use the sketch to determine the ratio of $\tan(90° - R)$. (1)

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

3.2 S(–3 ; –4) is a point on the Cartesian plane such that OS makes an angle of θ with the positive x-axis.
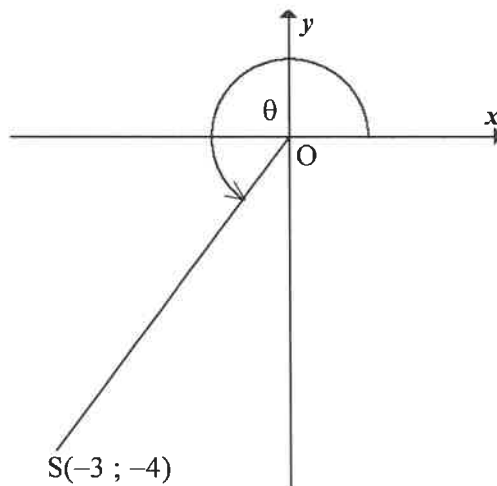
Calculate the following WITHOUT using a calculator:

3.2.1 The length of OS (2)
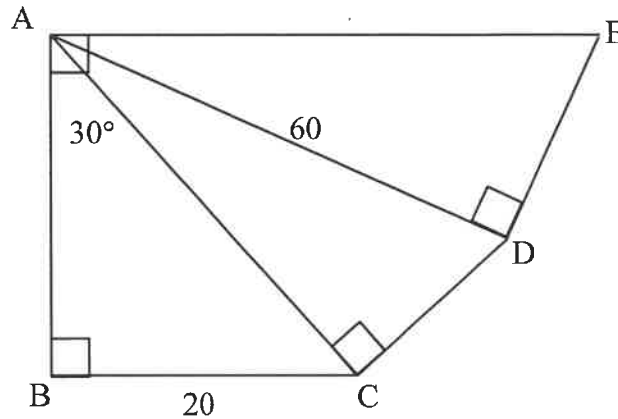
3.2.2 The value of $\sec \theta + \sin^2 \theta$ (3)

3.3 Determine the value of the following WITHOUT using a calculator:
$$\frac{\operatorname{cosec} 45°}{\sin 90° . \tan 60°}$$
(4)

[11]

QUESTION 4

4.1 In the diagram below, ABC, ACD and ADE are right-angled tirangles.
$\hat{BAE} = 90°$ and $\hat{BAC} = 30°$. BC = 20 units and AD = 60 units.


Calculate the:

4.1.1 Length of AC (2)

4.1.2 Size of $\hat{CAD}$ (2)

4.1.3 Length of DE (3)

4.2 Solve for x, correct to ONE decimal place, where $0° \leq x \leq 90°$:

4.2.1 $\tan x = 2{,}01$ (2)

4.2.2 $5\cos x + 2 = 4$ (3)

4.2.3 $\dfrac{\operatorname{cosec} x}{2} = 3$ (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 $0° \leq x \leq 360°$. Clearly show ALL the intercepts and asympotes. (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 $g(x) = a.\cos b\theta$
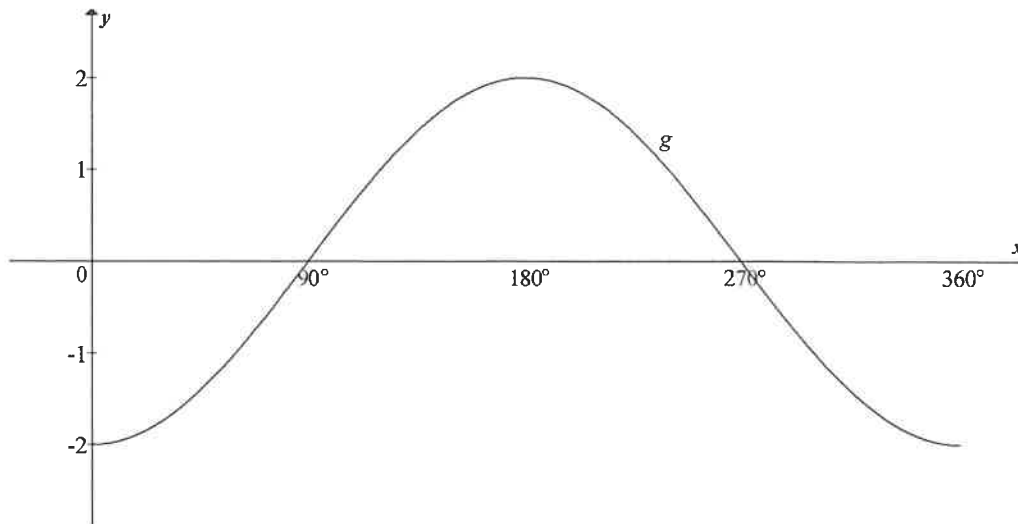
5.2.1 Write down the values of a and b. (2)

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:

$$-2\left(\cos 0° + \cos 1° + \cos 2° + ... + \cos 358° + \cos 359° + \cos 360°\right)$$ (2)

[12]

QUESTION 6

The diagram below shows a cup with a volume of 117π cm^3 and an inner diameter of 60 mm. Ignore the thickness of the cup.
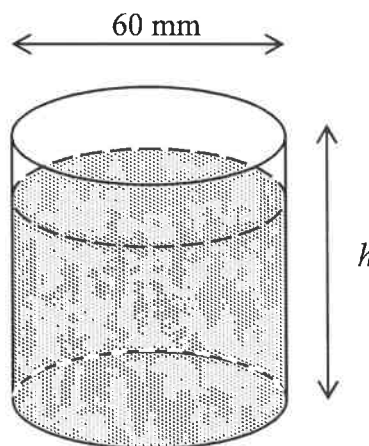
Calculate the:

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]

Give reasons for ALL geometry statements in QUESTIONS 7 and 8.

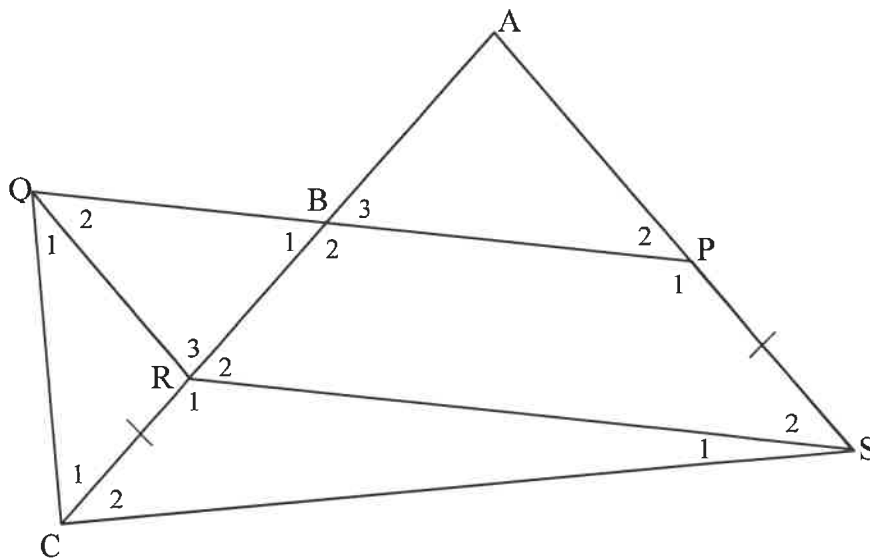## QUESTION 7

7.1   Complete the statement so that it is TRUE:

The line drawn from the midpoint of the one side of a triangle, parallel to the second side, …   (1)

7.2   ACS is a triangle. P is a point on AS and R is a point on AC such that PSRQ is a parallelogram. PQ intersects AC at B such that B is the midpoint of AR. QC is joined. Also, $CR = PS$, $\hat{C}_1 = 50°$ and $BP = 60$ mm.

7.2.1   Calculate the size of $\hat{A}$.   (5)

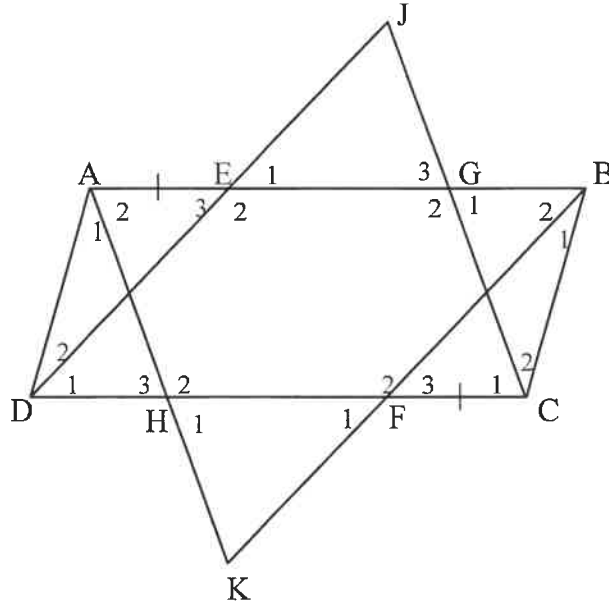7.2.2   Determine the length of QP.   (3)

                                                                                                                    [9]

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.
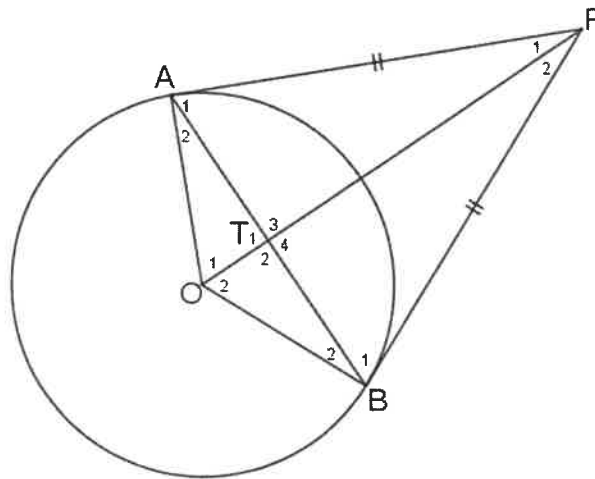

Prove that:

8.1.1   DJ ∥ 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 $O\hat{T}A = 90°$ (1)

[15]

TOTAL: 100