

Name and Surname :

Grade/Class : 10/..... **Mathematics Teacher** :

Hudson Park High School



GRADE 10
MATHEMATICS

November Paper 2

Marks : 100

Date : 7 November 2022

Time : 2 hours

Examiner : SLT

Moderator(s) : PHL CYT MAK
SMS RTS PKS

INSTRUCTIONS

1. Illegible work, in the opinion of the marker, will earn zero marks.
2. Number your answers clearly and accurately, exactly as they appear on the question paper.
3. **NB** ◦ **A blank space of at least two lines should be left after each answer.**
4. **NB** ◦ **Fill in the details requested on the front of this Question Paper and Answer Book first, before you start answering any questions.**

- Hand in your submission in the following manner :

(on top) **Answer Book**

(below) **Question Paper**

Please **DO NOT STAPLE** your Answer Book and Question Paper together.

5. Employ relevant formulae and show all working out.
Answers alone *may* not be awarded full marks.
6. (Non-programmable and non-graphical) Calculators may be used, unless their usage is specifically prohibited.
7. Answers must be written in blue or black ink, as distinctly as possible, on both sides of the page. An HB pencil (but not lighter eg. 2H) may be used for diagrams.
8. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.
9. If (Euclidean) GEOMETRIC statements are made, REASONS must be stated appropriately.

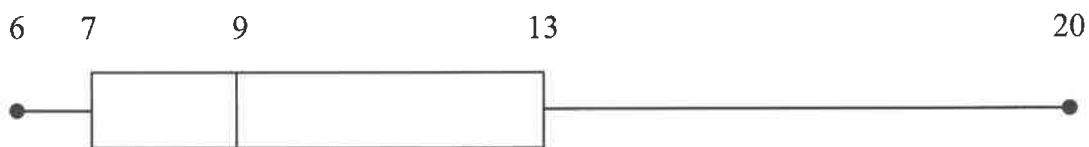
QUESTION 1

- 1.1. At a certain school, the Grade 10 Mathematics learners wrote a Test. A summary of their results (as a percentage) is shown below :

Result %	Number of learners
50 – 60	23
60 – 70	40
70 – 80	55
80 – 90	34
90 – 100	19

- 1.1.1. How many Grade 10's wrote the Test ? (1)
- 1.1.2. Estimate the following, showing ALL working out :
- (a) the average Test result, \bar{x} (4)
- (b) the upper quartile Test result, Q_3 (2)
- (c) the fourth decile Test result, D_4 (3)

- 1.2. There are 32 learners in a Maths class and their marks for the last Maths Test (out of 20 marks) is illustrated below using a box-and-whisker plot :



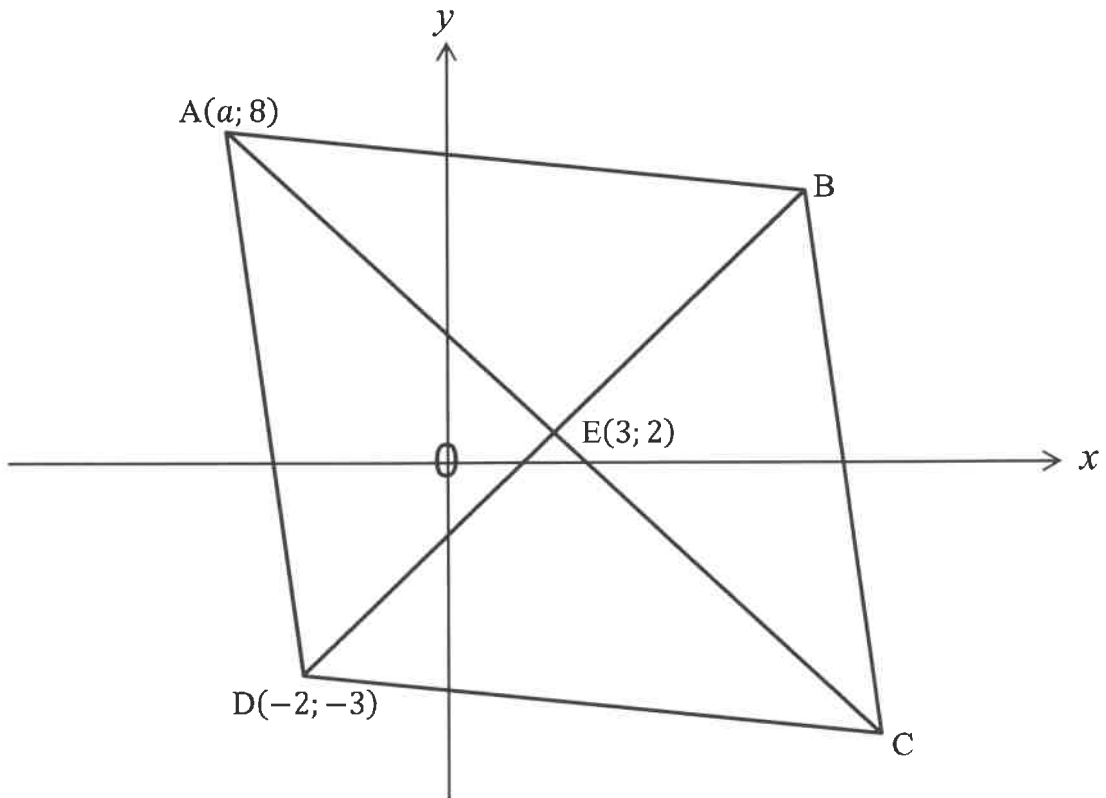
How many learners achieved results between $\frac{9}{20}$ and $\frac{13}{20}$? (2)

- 1.3. At a certain school, there are only two Mathematics classes in the Grade. The one class has 30 learners in it and achieved an average of 52 %. The other class has 20 learners in it and achieved an average of 76 %. Calculate the Mathematics grade average for this school. (3)

[15]

QUESTION 2

2. ABCD is a rhombus whose diagonals intersect at point E. $A(a; 8)$, $E(3; 2)$ and $D(-2; -3)$.



- 2.1. With reference to the properties of a rhombus, give the reasons why :

2.1.1. $DE = EB$ (1)

2.1.2. $\widehat{AED} = 90^\circ$ (1)

- 2.2. Calculate the

2.2.1. coordinates of B (2)

2.2.2. gradient of DEB (1)

2.2.3. equation of AEC (3)

2.2.4. value of a (1)

2.2.5. length of DE (in surd form) (2)

2.2.6. area of $\triangle AED$ (3)

2.2.7. size of \widehat{DAE} (2)

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QUESTION 3

3.1. Evaluate the following, if $x = 20^\circ$ and $y = 40^\circ$:

3.1.1. $-2 \tan^2 y$ (1)

3.1.2. $7 \sec x$ (1)

3.2. Solve for x :

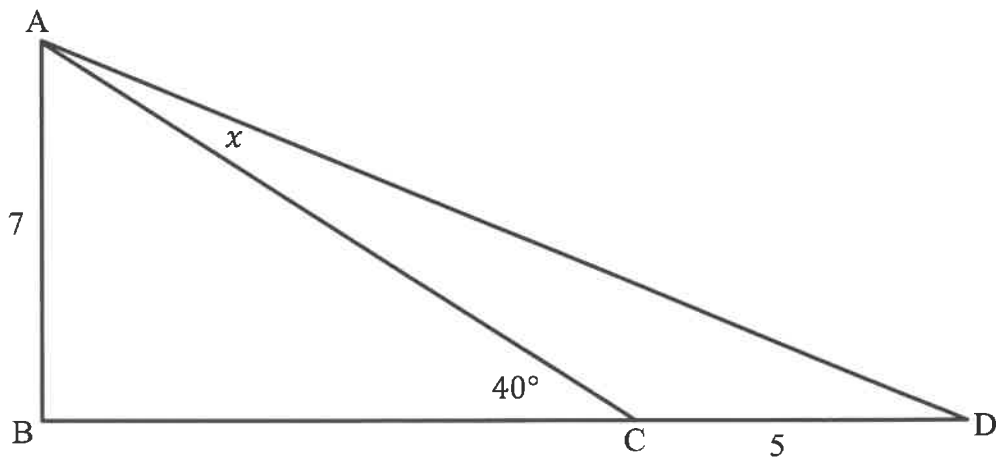
3.2.1. $5 \cos 3(x - 10^\circ) = 3$ ($0^\circ < 3(x - 10^\circ) < 90^\circ$) (3)

3.2.2. $2 \operatorname{cosec} x = 3$ ($0^\circ < x < 90^\circ$) (2)

3.3.1. Draw the special diagram used to evaluate the trigonometric ratios of 0° and 90° without the use of a calculator. (1)

3.3.2. Hence, using the diagram in (3.3.1.), evaluate $\cot 90^\circ$ without the use of a calculator. (1)

3.4. $AB \perp BCD$, $AB = 7$, $CD = 5$, $\widehat{BCA} = 40^\circ$ and $\widehat{CAD} = x$:



Calculate the :

3.4.1. length of BC (2)

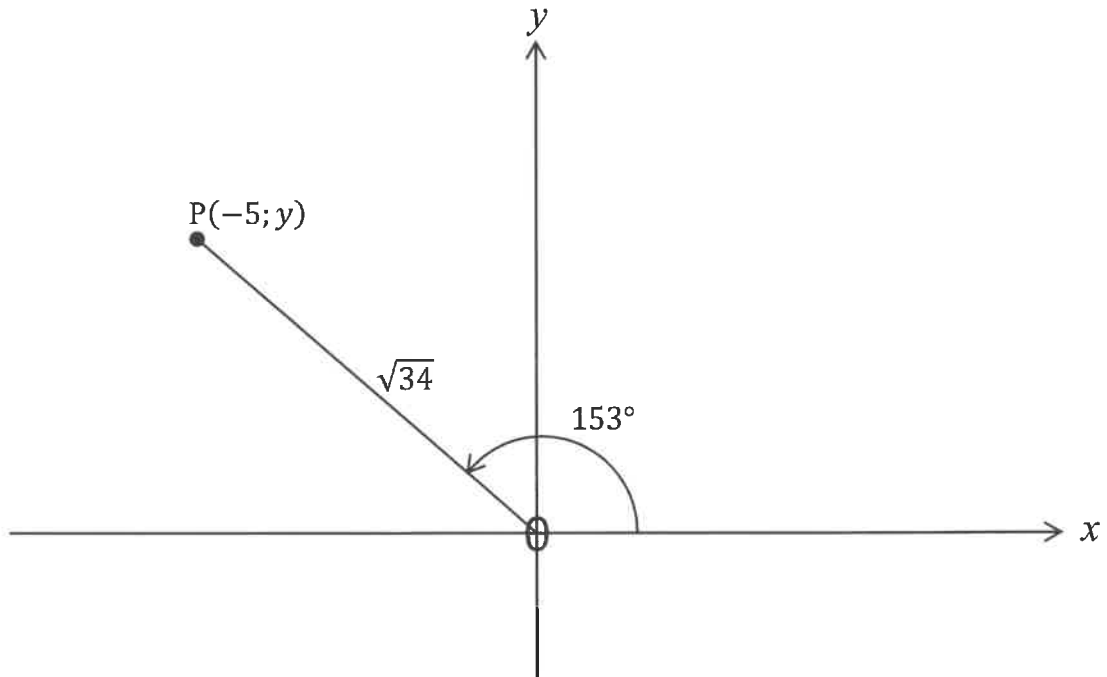
3.4.2. value of x (3)

[14]

QUESTION 4

CALCULATORS MAY NOT BE USED IN THIS QUESTION

4.1. $P(-5; y)$, $OP = \sqrt{34}$ and $P\hat{O}x = 153^\circ$:



Calculate :

4.1.1. y (1)

4.1.2. $\cos 153^\circ$ (1)

4.1.3. $\tan 27^\circ$ (2)

4.2. If $\sin 20^\circ = k$, where $0 < k < 1$, use a diagram to determine $\cos 20^\circ$ in terms of k . (3)

4.3. Given : $3 \cot \theta = 4$ and $\theta \in (90^\circ; 360^\circ)$

Draw a fully labelled diagram, in the correct quadrant, to represent the given information. All relevant values of x , y and r must be shown on the diagram. (4)

[11]

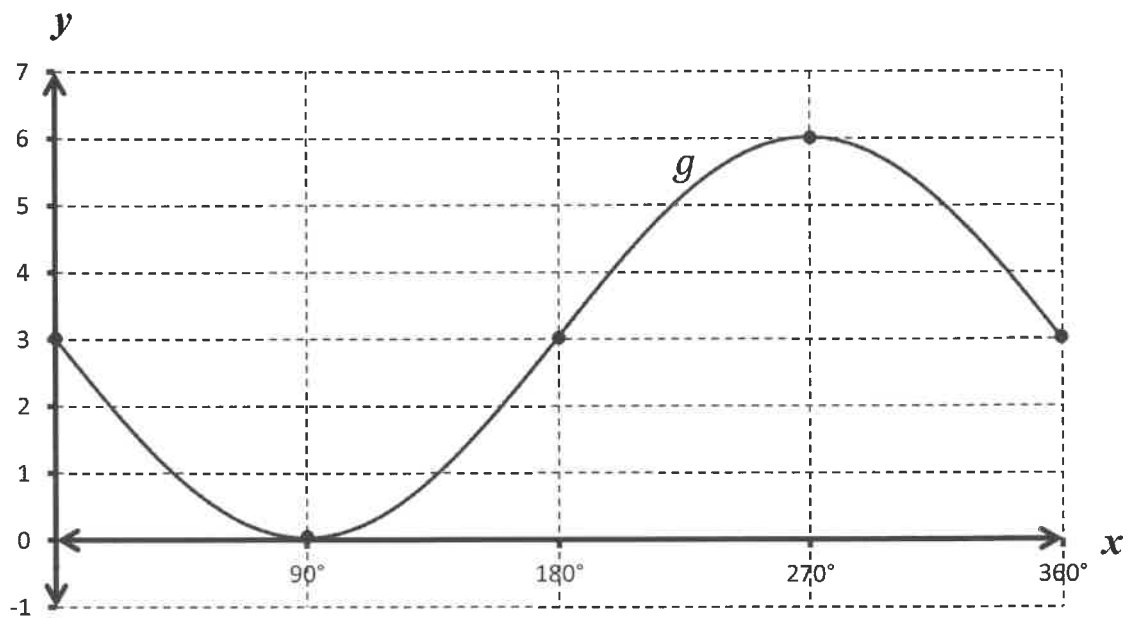
QUESTION 5

5.1. Given : $f(x) = \tan x - 2$

5.1.1. Determine the x -intercept of f that lies between 0° and 90° (1)

5.1.2. Sketch the graph of f for $x \in [0^\circ; 180^\circ]$.
Clearly indicate all intercepts with axes and asymptotes. (4)

5.2. Given : $g(x) = a \sin x + q$ for $x \in [0^\circ; 360^\circ]$:



5.2.1. Write down the values of :

(a) a (1)

(b) q (1)

5.2.2. State the range of g . (1)

5.2.3. Determine the values of x , where $x \in [0^\circ; 360^\circ]$, for which g is increasing. (1)

5.2.4. What is the maximum value of g ? (1)

5.2.5. Determine the values of x , where $x \in [0^\circ; 360^\circ]$, for which $g(x) - 3 \geq 0$ (2)

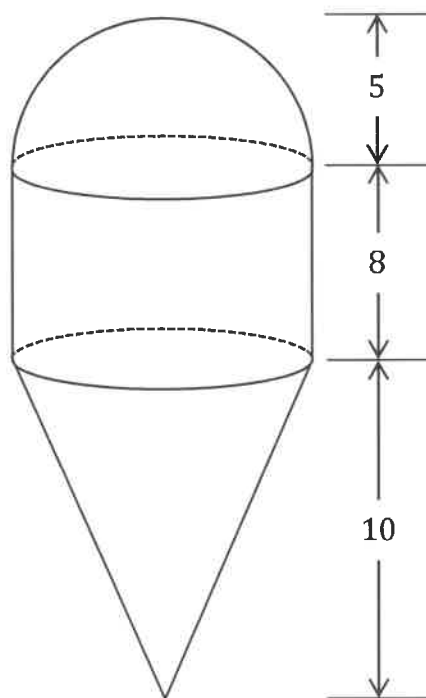
5.2.6. If g is reflected in the x -axis and then reflected in the y -axis to become h ,
determine the equation of h in the form $y = \dots$.
You may leave your answer in terms of a and q or the values found in (5.2.1.). (2)

[14]

QUESTION 6

$A = \pi r^2$	$A = \frac{1}{2}bh$	$A = 4\pi r^2$	$A = \pi rh$
$V = \frac{4}{3}\pi r^3$	$V = Ah$	$V = \frac{1}{3}Ah$	

- 6.1. A solid shape is made by gluing a solid hemisphere, cylinder and cone together as shown below :

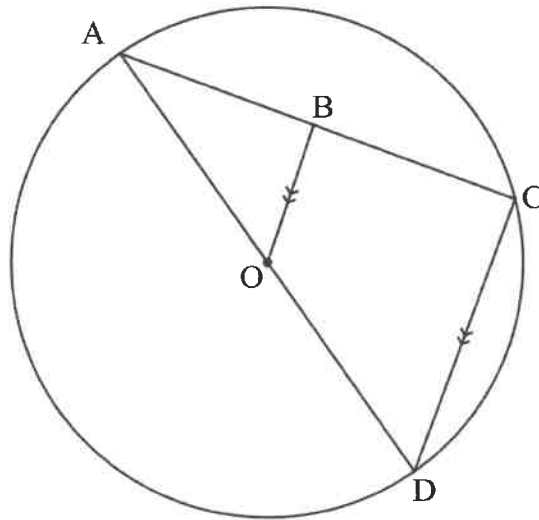


- 6.1.1. The hemisphere, cylinder and cone all have the same radius. What is their radius ? (1)
- 6.1.2. Calculate the total surface area of the solid. (5)
- 6.2. For a certain solid (right circular) cone the
- radius is r cm
 - perpendicular height (of the apex above the circular base) is h cm
 - volume is 50 cm^3 .
- If, for this cone, the radius is halved and the perpendicular height is tripled, what will its new volume be ? (3)

[9]

QUESTION 7

7.1. AD is the diameter of the circle with centre O. $OB \parallel DC$, $BC = 6$ and $DC = 8$:

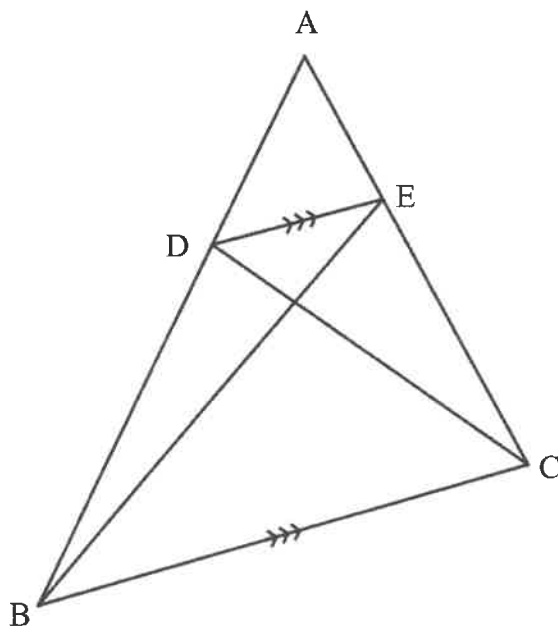


Calculate the lengths of :

7.1.1. AB (2)

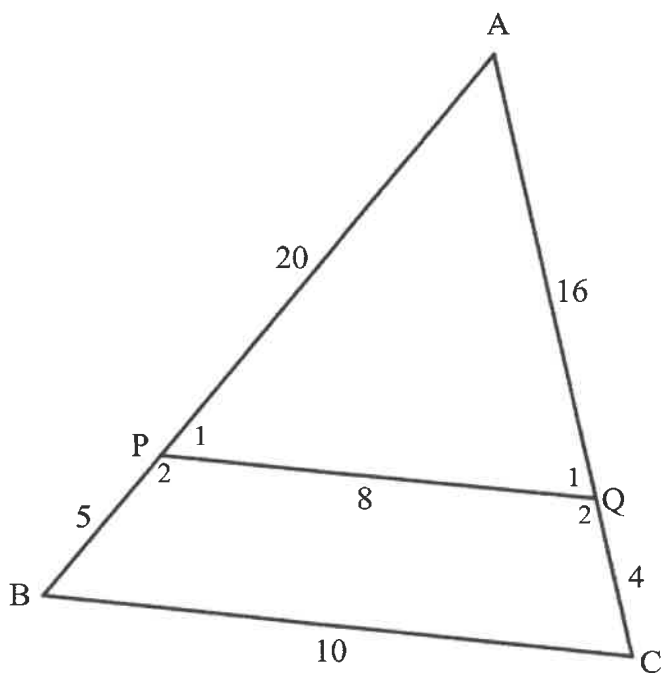
7.1.2. OB (2)

7.2. In the diagram below, $DE \parallel BC$:



Give the reason why : $\text{area } \triangle DEC = \text{area } \triangle EDB$. (2)

7.3. $AP = 20$, $PB = 5$, $AQ = 16$, $QC = 4$, $BC = 10$ and $PQ = 8$:

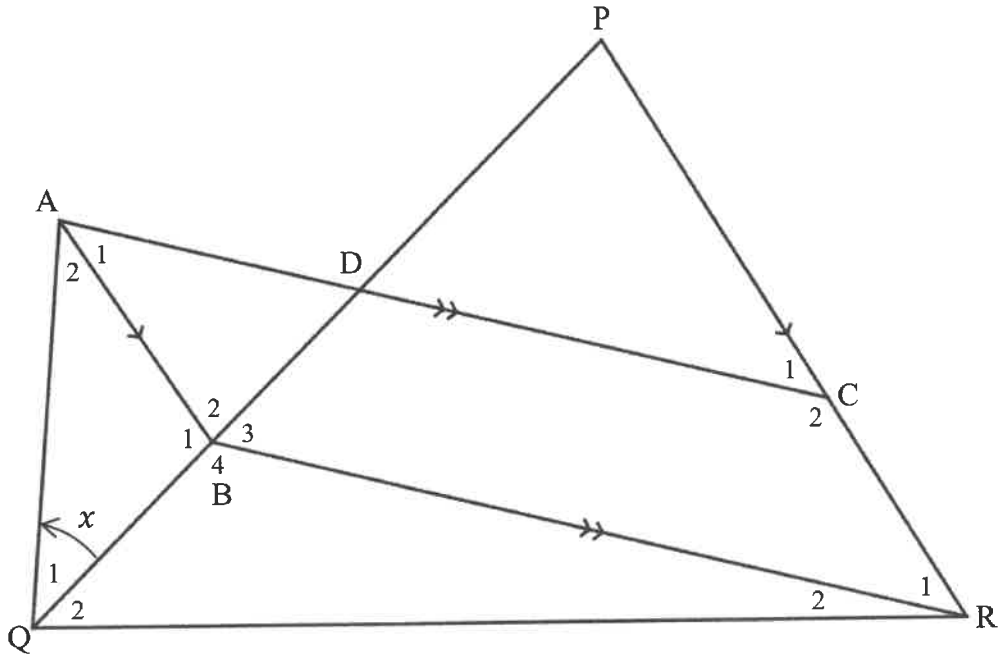


Prove that :

7.3.1. $\triangle ABC \sim \triangle APQ$ (4)

7.3.2. $PQ \parallel BC$ (2)

7.4. $PR \parallel AB$, $AC \parallel BR$ and $BQ = CR$. Let $\widehat{Q}_1 = x$:



- 7.4.1. Give the reason why $ACRB$ is a parallelogram. (1)
- 7.4.2. Prove that $AB = BQ$. (2)
- 7.4.3. Determine \widehat{QPR} in terms of x . (6)

[21]

TOTAL	100
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