


Name and Surname :

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

Hudson Park High School



GRADE 10
MATHEMATICS
June Examination

Marks :

100

Time : 2 hours

Date : 12 June 2017

Examiner : FRD

Moderator(s) : SLT, CYT, GRT, GRS

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**
 - Start each QUESTION at the *top of a page*.
 - Leave *2 lines* open between each of your answers.
4. **NB** Fill in the details requested on the front of this Question Paper and *staple* your submission in the following manner :
 - Question Paper (on top)
 - Answer pages (below).
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. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.
8. If (Euclidean) Geometric statements are made, reasons must be stated appropriately.

QUESTION 1 [9 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

- 1.1. Between which two consecutive natural numbers does $\sqrt[3]{35}$ lie?
Show all working out. 2
- 1.2. Write $2,1\bar{8}$ as a rational number. Show all working out. 4
- 1.3. Given $P = \frac{\sqrt{4x-7}}{3x+2}$ write down any x value for which:
1.3.1. P is undefined
1.3.2. P is non-real
1.3.3. P = 0 3

QUESTION 2 [8 marks]

- 2.1. Multiply out and simplify completely :
- 2.1.1 $x - (2x - 1)x - 1$ 2
- 2.1.2. $(3p - 2q)(9p^2 + 6pq + 4q^2)$ 2
- 2.1.3. $3x^{\frac{1}{3}}(2x^{\frac{1}{2}} - 5x^{\frac{1}{3}})$ 2
- 2.2. CALCULATORS MAY NOT BE USED IN THIS QUESTION
- If $a - \frac{4}{a} = 3$ determine the value of $a^2 + \frac{16}{a^2}$ 2

QUESTION 3: [9 marks]

Factorise fully:

- 3.1. $ax - bx - ay + by$ 2
- 3.2. $16x^3 + \frac{y^3}{4}$ 3
- 3.3. $6 \cdot 5^{2x} - 5^x - 12$ 2
- 3.4. $6x^2 - 5xy + y^2$ 2

QUESTION 4: [8 marks]

Simplify fully:

4.1. $\frac{12^x \cdot \left[\frac{1}{4}\right]^{x-1}}{9^{-x-1} \cdot 27^x \cdot 8}$ 4

4.2. $\frac{\frac{1}{x} - \frac{1}{y}}{\frac{x}{y} - 1}$ 4

QUESTION 5: [21 marks]

Solve for x :

5.1. $x^2 - 6x = 0$ 2

5.2. $\frac{x+1}{x-2} = \frac{x-2}{x+1}$ 3

5.3. $4x^2 = 2(5x + 3)$ 3

5.4. $3^{x-1} + 3^{x+1} = 30$ (without a calculator) 4

5.5. $3x^{\frac{3}{7}} + 5 = 0$ 3

5.6. $3 \cdot 2^{x+3} = \frac{1}{7}$ 3

5.7. $x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 8 = 0$ 3

QUESTION 6: [7 marks]

6.1. Consider the inequality $-3 < 15 - 3x \leq 6$

6.1.1. Solve for x 2

6.1.2. Show the answer to 6.1.1. on a number line 1

6.1.3. Give the answer to 6.1.1. in interval notation 1

6.2. Solve for x and y :

$2x = 3y + 5$ and $3x + 6y = 11$ 3

QUESTION 7: [6 marks]

- 7.1. Consider the sequence $7; 15; 23; \dots; 1255$
- 7.1.1. Determine the general term T_n of the sequence in simplest form 2
- 7.1.2. Hence, determine the number of terms in the sequence 2
- 7.2. If $2x - 5; 2x + 1; 4x + 3$ are the first three terms of a linear pattern.
Determine the value of x . 2

QUESTION 8: [13 marks]

- 8.1.  $PQ \perp QR$ and $QS \perp PR$

Write down in terms of PQ, QR, PR, QS, PS and RS :

Two ratios for $\sin P$ 2

- 8.2. If $\hat{A} = 64,3^\circ$ and $\hat{B} = 52,3^\circ$, determine the following:

8.2.1. $\cos \frac{A}{2}$ 1

8.2.2. $\frac{\sin B}{3}$ 1

8.2.3. $\tan A + 10$ 1

8.2.4. $5 \operatorname{cosec} B$ 1

8.2.5. $3 \sin^2 A$ 1

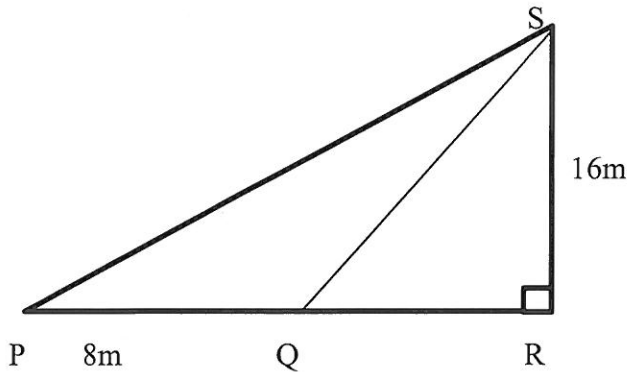
- 8.3. Solve for θ

8.3.1. $\cos \theta = 0,866$ for $\theta \in [0^\circ; 90^\circ]$ 1

8.3.2. $\cot \theta = 4,571$ for $\theta \in [0^\circ; 90^\circ]$ 2

8.3.3. $3 \sin(2\theta - 54^\circ) = 2,88$ for $(2\theta - 54^\circ) \in [0^\circ; 90^\circ]$ 3

QUESTION 9: [6 marks]



In the diagram, $SR = 16\text{m}$ and $PQ = 8\text{m}$. $\hat{S}PQ = 32^\circ$ and $\hat{R} = 90^\circ$

Determine the following:

- | | |
|-------------------------------------|----------|
| 9.1. the length of PR | <u>3</u> |
| 9.2. the length of QR | <u>1</u> |
| 9.3. the size of angle $\hat{S}Q R$ | <u>2</u> |

QUESTION 10: [13 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

- | | |
|--|----------|
| 10.1. Sketch the diagrams for special angle values of 30° , 60° , 45° , 0° and 90° | <u>3</u> |
| 10.2. Now determine the values of: | |
| 10.2.1. $\tan 30^\circ$ | |
| 10.2.2. $\cos 0^\circ$ | |
| 10.2.3. $\sin 45^\circ$ | |
| 10.2.4. $\sec 60^\circ$ | <u>4</u> |
| 10.3. If $\sin 20^\circ = a$, use a diagram to determine the value of $\tan 20^\circ$ | <u>3</u> |
| 10.4. If $\sin X = \frac{-5}{13}$ and $\cos X > 0$ use a diagram in an appropriate quadrant to determine the value of $\cos X$ | <u>3</u> |

TOTAL: 100 MARKS