

Office

NORMAN HENSILWOOD HIGH SCHOOL
EXAMINATIONS



DATE	6 JUNE 2011
GRADE	10
SUBJECT AND PAPER	MATHEMATICS
TIME	2 HOURS
MARKS	110
EXAMINER	F RICH
MODERATOR	JC FM LJ CM GJ

D. C. P.
Checked!

30.5

INSTRUCTIONS:

1. This paper consists of 10 questions. Answer ALL the questions.
 2. Clearly show ALL calculations you have used in determining the answers.
 3. An approved calculator (non-programmable and non-graphical) may be used
 4. Answers should be rounded off to TWO decimal places, unless stated otherwise.
 5. Number the answers EXACTLY as the questions are numbered.
 6. Diagrams are not necessarily drawn to scale.
 7. It is in your own interest to write legibly and to present the work neatly.
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QUESTION 1

- 1.1 For which value(s) of x is the expression $\sqrt{\frac{5}{x-2}}$:
- 1.1.1 real (2)
- 1.1.2 unreal (1)
- 1.2 For which values of x is the expression $\sqrt{\frac{5}{x^2-4}}$ undefined? (2)
- 1.3 State whether the following statements is TRUE or FALSE:
- 1.3.1 Every integer is a natural number. (1)
- 1.3.2 Any number divided by zero is zero. (1)
- 1.3.3 A rational number can either be terminating or recurring. (1)
- 1.3.4 Every irrational number is a real number. (1)

[9]

QUESTION 2

Simplify as far as possible:

- 2.1 $(a + 3b)(2a + b)$ (3)
- 2.2 $(2x - 3)(4x^2 + 6x + 9)$ (3)
- 2.3 $\frac{2a+b}{b} - \frac{b-1}{2a}$ (3)
- 2.4 $5\sqrt{3} - \sqrt{27}$ (3)
- 2.5 $x^{2\frac{1}{4}} \div x^{\frac{1}{4}}$ (1)
- 2.6 $\frac{5^{x+1} - 5^x}{2.5^x}$ (3)

[16]

QUESTION 3

Factorise completely and simplify:

3.1 $x^2 - 7x + 12$ (2)

3.2 $(p - 1) - q(1 - p)$ (3)

3.3 $\frac{5x-5}{x-3} \div \frac{x^2+2x-3}{x^2-9}$ (5)

[10]

QUESTION 4

Solve for x :

4.1 $4(x - 1) = 5(2x + 4)$ (3)

4.2 $\frac{3}{x} - \frac{14}{3} = \frac{2}{3x}$ (3)

4.3 $x^{\frac{3}{2}} = 8$ (2)

4.4 $3 \cdot 9^x = 81$ (3)

4.5 $x(x + 5) = 0$ (2)

4.6 $x + \frac{8}{x} + 6 = 0$ (3)

4.7 $5(3 - x) + 2 < x + 7$ (4)

[20]

QUESTION 5

5.1 Given $5p = \frac{6q}{r} - 3$, make q the subject of the formula. (3)

5.2 Solve the following set of equations simultaneously.

$x + 2y = -11$ 1

$2x - 6 = 3y$ 2 (5)

5.3 Where are simultaneous equations used in graphs. (1)

[9]

QUESTION 6

Given the sequence, 3; 9; 15; 21;..... Answer the questions that follow:

6.1 Is the sequence linear or non linear? Explain how you made your decision. (2)

6.2 Write down the next three terms. (3)

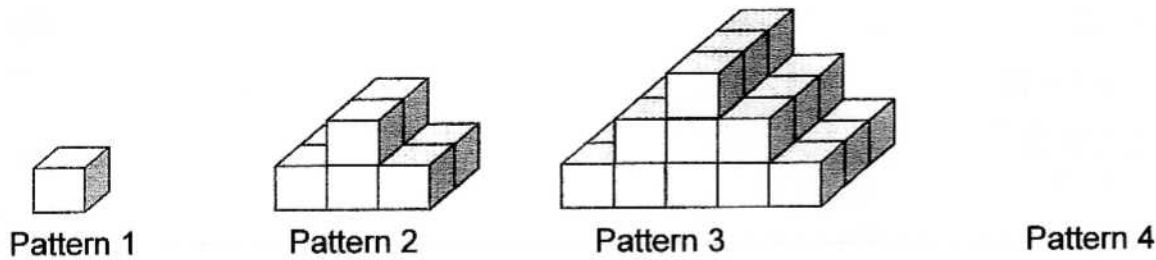
6.3 Find the formula for the general term (nth term). (3)

6.4 Which term has the value 243? (3)

[11]

QUESTION 7

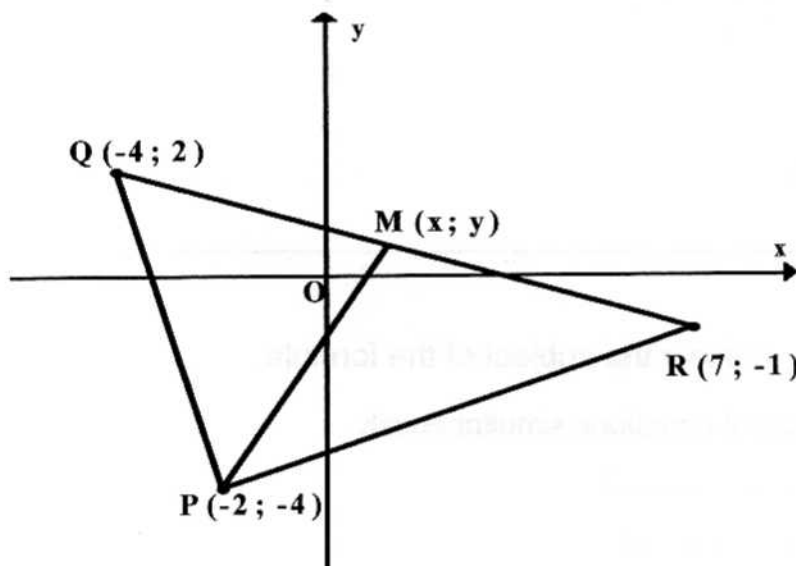
Sarah uses cubes to build steps and notices the following non-linear pattern:



- 7.1 How many cubes will be in the fourth pattern? (1)
 7.2 Give the formula for the n th pattern, T_n . (2)
 7.3 What will be the value of the 19th term? (2)
-
- [5]

QUESTION 8

$P(-2; -4)$, $Q(-4; 2)$ and $R(7; -1)$ are vertices of $\triangle PQR$ in a Cartesian plane as shown below.



- 8.1 Find the midpoint, M , of QR . (4)
 8.2 If the gradient of PM is -1 , Find the equation of PM . (3)
 8.3 Calculate the gradient of QP and PR . (4)
 8.4 Hence, show that $\triangle PQR$ is a right angle triangle. (2)
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- [13]

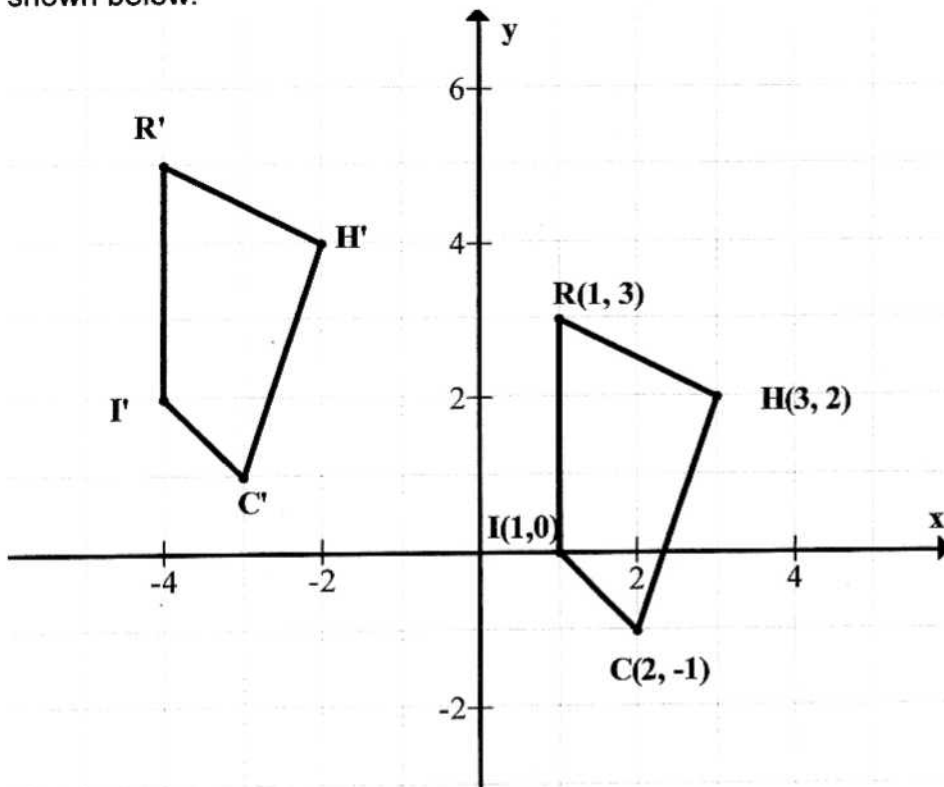
QUESTION 9

$A(-2; 4)$, $B(x; 1)$, and $C(-4; -2)$ are points on a Cartesian plane.

- 9.1 Calculate the value of x if A, B and C are collinear. (4)
 9.2 Show that A and C are equidistant from the origin. (5)
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- [9]

QUESTION 10

$R(1; 3)$, $I(1; 0)$, $C(2; -1)$ and $H(3; 2)$, are the coordinates of the vertices of quadrilateral RICH shown below.



10.1 If RICH is translated to give $R'I'C'H'$, give the rule for this translation. (2)

10.2 If the image of H is the point $H''(2; 3)$. Describe the reflection. (2)

10.3 Give the coordinates of R'' , the reflection of R in the x -axis. (2)

10.4 In general, write down the rule for any point $(x; y)$ which is first reflected in the y -axis then translated two units down. (2)

[8]

TOTAL: 110 Marks