



GRADE 11 STANDARDISATION PROJECT
NOVEMBER 2013

MATHEMATICS: PAPER I

Time: 3 hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 9 pages and an Information Sheet of (i) page. Please check that your paper is complete.
 2. Read the questions carefully.
 3. Answer **all** the questions.
 4. Number your answers exactly as the questions are numbered.
 5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
 6. Round off your answers to one decimal digit where necessary.
 7. All the necessary working details must be clearly shown.
 8. It is in your own interest to write legibly and to present your work neatly.
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SECTION A**QUESTION 1**Solve for x :

(a) $2x(x+5) = x^2 - 16$ (4)

(b) $\frac{3px}{2} = 3x + 2m$ (4)

(c) $4^{2x+1} = \sqrt{8^{2x-10}}$ (4)

(d) $(3x+1)(x-5) \leq 0$ (3)

(e) $(x + \sqrt{m})^2 = 2x\sqrt{m} + (9 + m)$ (3)

[18]**QUESTION 2**Given: $f(x) = 2(x-3)^2 + 5$

Calculate:

(a) $f(5)$ (2)

(b) x for $f(x) = 103$ (4)

[6]**QUESTION 3**

Refer to the pattern below and answer the questions that follow.

2 6 12 20 30 42 2 6 12 20 30 42 ...

Determine:

(a) the general formula (T_n) for the first six terms of the pattern. (4)

(b) the value of the 43 561st term. (2)

[6]

QUESTION 4

Sketch the following on separate set of axes: (Label all relevant points, intercepts and asymptotes.)

(a) $3x + 5y = 30$ (3)

(b) $y = 2^x + 3$ (3)

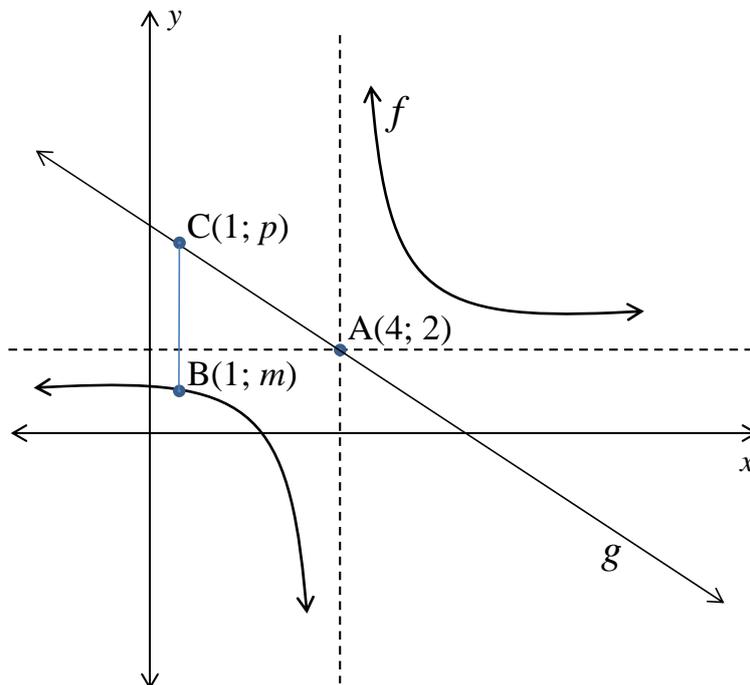
(c) $y = ax^2 + bx + c$ where $a > 0$; $b < 0$ and $(b^2 - 4ac) < 0$ (3)

[9]

QUESTION 5

In the diagram below $A(4; 2)$ and $C(1; p)$ lie on $g(x)$, a line of symmetry for the graph of $y = f(x)$.

The dotted lines that go through A represent the asymptotes for $f(x)$. Point $B(1; m)$ lies on the graph of $f(x)$.



(a) Given $f(x) = \frac{2}{x - w} + d$. Write down the values of w and d . (2)

(b) Determine the equation of $g(x)$. (3)

(c) Calculate the length of line CB . (4)

(d) How many units to the left would you need to shift $f(x)$ so that it intersects the x -axis at the origin? (4)

[13]

QUESTION 6

(a) Simplify the following expressions:

$$(1) \quad \frac{2^{x+3} + 2^x}{\sqrt{2^{2x}}} \quad (3)$$

$$(2) \quad \frac{2x^2 + 15x + 7}{x^2 - 49} \times \frac{x \cdot 8^{2x} - 7 \cdot 8^{2x}}{4^{3x}} \quad (6)$$

(b) Given: $m = 12$. Determine $6^5 \cdot 4^8 \cdot 2^4 \cdot 3^8$ in terms of m . (4)
[13]

QUESTION 7

(a) Given:

- $H = ax^2 + bx + c$
- $b^2 - 4ac = 0$
- $a + 5 = c$
- $5a + 5 = 3c - 2$

(1) Determine the value of b when $b > 0$. (5)

(2) How many solutions would you get for $H = 0$? (1)

(b) Given: $(x - b)^2 = 15$. Determine the value of $3x^2 - 6bx + 3b^2 + 4$. (4)
[10]

75 marks

SECTION B**QUESTION 8**

A bank offers interest on investments at a rate of 15% per annum *compounded monthly*.

- (a) Calculate the effective interest rate equivalent to this. (2)
- (b) Determine how much a person must invest now (as a lump sum) so that they have R20 000 in four years time. (2)
- (c) Suppose Flippie follows the following savings plan (in the bank with 15% per annum compounded monthly):
- 1 September 2014: Deposit R3 500
1 February 2016: Deposit R8 100
1 January 2017: Withdraw R4 200
1 July 2017: Deposit R8 500
- Determine if Flippie will have more than R20 000 in his account by 1st January 2018. (Show all your working.) (7)
- (d) Flippie has a new trailer worth R8 500. The depreciation rate on this item is 10% per annum using the reducing balance method. Calculate the value of his trailer after 4 years. (2)
- (e) Draw a sketch graph showing the reducing value of Flippie's trailer over the 4 year period. (3)
- [16]**

QUESTION 9

Flippie sets off on a camping trip. He heads south and sets up his tent at Addo Elephant Park. He opens the information booklet and analyses some of the information about the Eastern Cape Aloe.

	end of first year	end of second year	end of third year	end of fourth year
Number of leaves on Aloe	2	x	$2x + 1$	$4x$

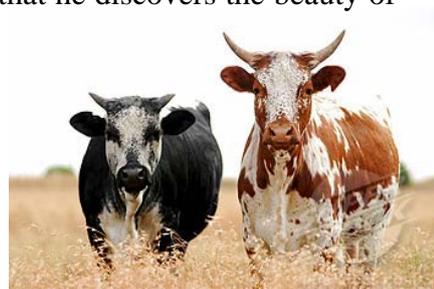
- (a) He suspects that the pattern has a constant *second difference*. Use this fact to calculate how many leaves are on the Aloe at the end of the fourth year. (5)
 - (b) Determine an expression for the number of leaves on the Aloe at the end of the n^{th} year. (6)
 - (c) Determine the end of which year the Aloe will have 572 leaves. (5)
- [16]**

QUESTION 10

Flippie takes his tent and heads for Morgans Bay. It is here that he discovers the beauty of Nguni cattle.

In a herd of 200 Nguni cattle that Flippie counts:

- 130 cattle have black patches.
- 110 cattle have brown patches.
- x cattle have both black and brown patches.
- 5 cattle have neither brown nor black patches.



- (a) Draw a Venn diagram to represent the above information, showing values in terms of x . (4)
 - (b) Calculate how many cattle have both black and brown patches. (3)
 - (c) Determine the probability that if Flippie randomly selected a single Nguni from the 200 cattle, it would *only* have brown patches. (2)
- [9]**

QUESTION 11

Flippie stops at a little shop on the side of the road.

He buys:

- 1 jar of jam
- 1 bag of oranges



- (a) Calculate how much change Flippie receives if he gives the shopkeeper R30. (1)
- (b) The shopkeeper's money box has three R1 coins, two R2 coins and a single R5 coin.

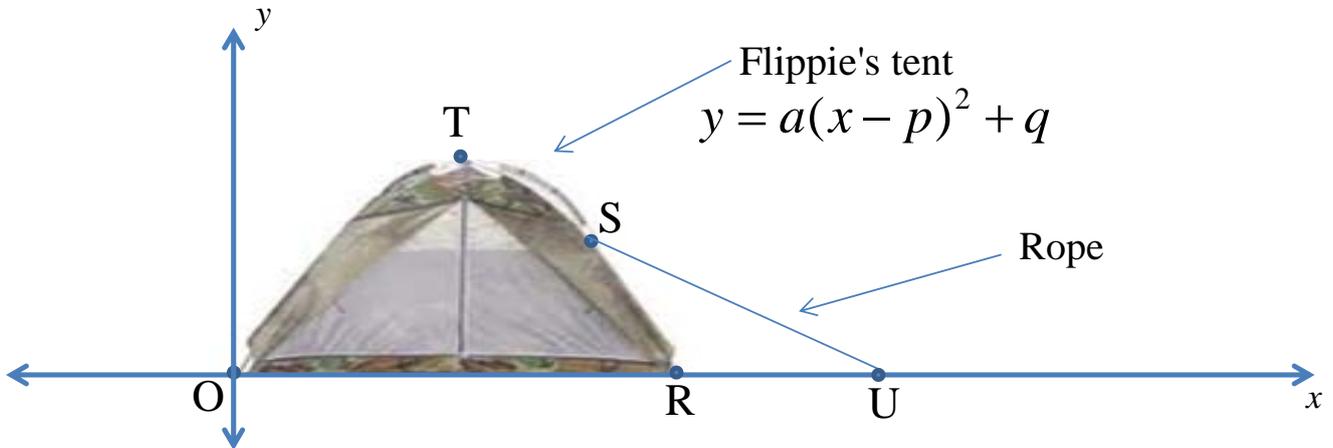


- Determine the various combinations in which Flippie can receive change and give the number of times that each of the combinations can occur. (4)
- (c) Suppose the shopkeeper randomly gives the correct change. Write down the probability that Flippie receives:
- (i) a R5 coin. (1)
 - (ii) two R2 coins. (1)
 - (iii) at least one R1 coin. (1)
- [8]**

QUESTION 12

Flippie's next stop is at the Brenton on Sea caravan park where he sets up his tent.

Use the diagram and information below to help answer the questions that follow.



- The front of Flippie's tent has the shape of a parabola.
- The highest point (T) of Flippie's tent is 2 metres above the ground.
- The width (OR) of Flippie's tent is 3 metres.
- Point O is the origin.

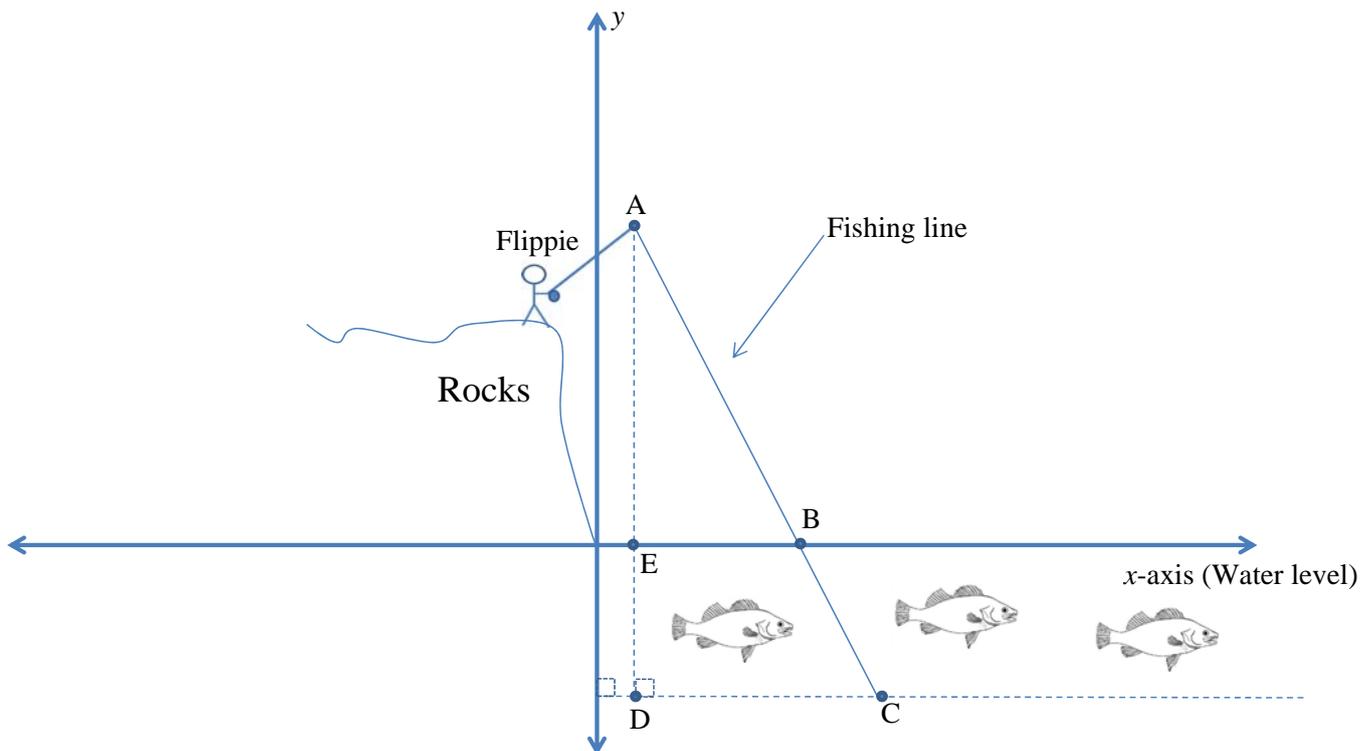
- (a) Write down the coordinates of point T. (1)
- (b) Show that the value of a in the equation for Flippie's tent is $-\frac{8}{9}$. (3)
- (c) Calculate the coordinates of point S, given that S is $\frac{16}{9}$ metres directly above the ground. (4)
- (d) The gradient of line SU (Rope) is $-\frac{10}{9}$. Determine the distance from R to U. (4)

[12]

QUESTION 13

Flippie gets up early in the morning and goes fishing. He casts his line out from the top of the rocks.

- Points A, B and C lie on the fishing line which is a straight line.
- Flippie's fishing rod with tip at point A is a straight line.
- Point C lies on the sand below the water.



- (a) Flippie's fishing rod has the equation of $y = mx + m + 6$ and the equation of the fishing line is $y = bx + m + 8$. Determine the x coordinate of point E in terms of m and b . (5)
- (b) $AC = p^2 + p + 1$ units, $DC = p^2 + p - 7$ units and $AD = p^2 + p$ units. Given $p \in N$, calculate the length of AC. (7)
- (c) Calculate the coordinates of point E, given $m = \frac{1}{2}$. (2)

[14]

75 marks

Total: 150 marks