STANMORE SECONDARY SCHOOL

MATHEMATICS

GRADE 9

NOVEMBER 2019

MARKS: 120

TIME: 2 hours

Examiner: MRS. J. GENGIAH

Moderator: MR. S. NAIDOO

Instruction to Candidates

Read these instructions carefully before answering the questions.

1. Answer **ALL** questions. This question paper consists of 10 questions AND 11 pages.

2. Diagrams have not been drawn to scale.

3. Clearly show all calculations, diagrams, graphs, etc. you have used in determining your answer.

4. It is in your own interest to write legibly and present your work neatly.

5. Approved scientific calculators (non-programmable) may be used.

Name: _____

Grade: _____

Grade 9 Mathematics November 2019

Question One – Multiply and Simplify each of the following expressions

1.1. $(2x - 7)(2x + 7)$

_____

_____(3)

1.3. $(a + 5)^2 - (a - 4)(a - 3)$

1.2. $(x - 9)(x + 8)$

_____

_____(3)

_____

_____

_____

_____

_____(4)

[10]

Question Two - Factorise fully:

2.1. $6x^2y - 3xy + 9xy^2$

_____

_____(2)

2.3. $2x^2 - 162$

2.2. $x^2 - 16x + 64$

_____

_____(2)

2.4. $(2x + 2y) - (dx + dy)$

_____

_____(3)

_____

_____(3)

[10]

Question Three – Simplify fully

3.1 $\dfrac{5x+10}{5x}$

3.2 $\dfrac{3a^2b^3 - 6ab^2c^2 + 4a^2b^2c^2}{-3abc}$

_____

_____

_____(3)

_____

_____

_____(4)

[7]

Question Four - Solve for x:

4.1. $3(x + 2) - 2(x - 5) - (x - 2) = -2(x + 3) + 12$

_____

_____

_____

_____

_____ (5)

4.2. $x^2 + 6x = 0$ 4.3 $2^x = 64$

_____   _____

_____   _____

_____ (3)   _____ (2)

4.4. $\dfrac{x+3}{4} - \dfrac{x+2}{8} = \dfrac{x}{2} - 1$

_____

_____

_____

_____

_____

_____

_____ (5)

[15]

Question Five

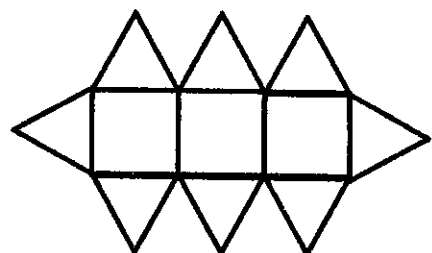Zara is making a pattern. She is putting triangles around squares as show in the diagram below.
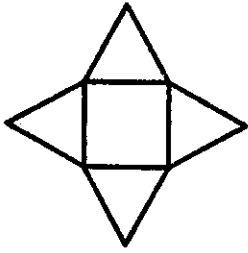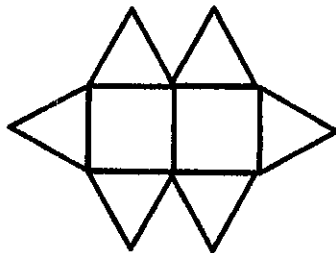
Pattern 1   Pattern 2   Pattern 3

5.1 Write down the number of squares and triangles that will be in Pattern 4.

Squares: _____   Triangles: _____   (2)

5.2 If Number of Squares in each pattern = x, write down the general rule to calculate the number of triangles in each pattern for the nth pattern.

_____(2)

5.3 Calculate how many Triangles will there be in the 49th term.

_____(2)

                                                                            [6]

Question Six – Financial Maths

6.1. Thembi wants to invest R6000 for 3 years at 9% interest. She is not sure whether to invest using Simple Interest or Compound Interest. Which way should she invest?
Show all working. Formulae: $A = P(1 + r \times n)$ and $A = P(1 + r)^n$

_____

_____

_____

_____[7]

6.2. Wesley bought a sound system for R1600. He paid a 15 % deposit.

6.2.1. Calculate the amount of the deposit paid.

_____

_____(2)

6.2.2. How much does he still owe on the sound system (balance)?

_____

_____(1)

6.2.3. He takes out a hire purchase loan to repay the balance. 13% p.a. simple interest is being charged and the amount must be repaid monthly over 3 years.

6.2.3.1. Calculate the total amount he must pay in the next 3 years.

_____

_____

_____

_____

_____(3)

6.2.3.2. Calculate the monthly payment.

_____

_____(2)

[15]

Question Seven

A survey amongst 20 learners showed that they spent the following amount of their pocket money while on an excursion:

47	31	42	33	52	75	56	86	72	40
25	28	42	30	70	31	76	31	48	25

7.1 Arrange the data in ascending order.

_____(1)

7.2 Determine the following:

7.2.1 The mode

_____(1)

7.2.2 The median

_____(2)
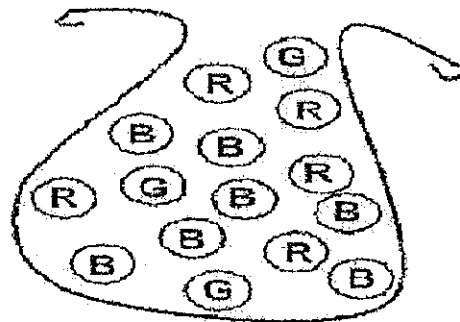
7.2.3 The range

_____(2)

7.2.4 The mean

_____

_____(2)

[8]

7.3 The bag contains marbles of different colours.
R – Red; G – Green; B – Blue.
One marble is picked randomly.
Determine the probability that:

7.1 a red marble is picked.

_____(2)

7.2. a green or blue marble is picked.

_____(2)

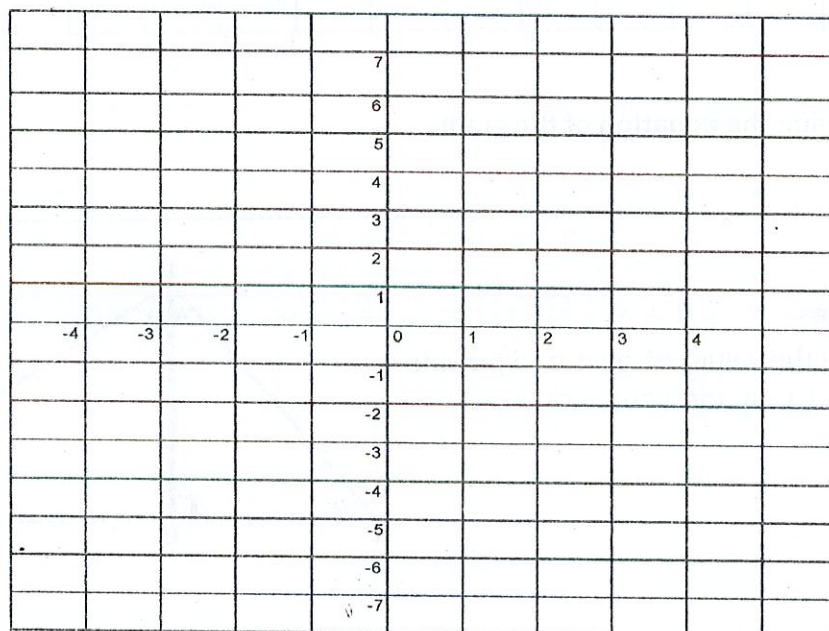7.3. a yellow marble is picked.

_____(2)

[6]

Question Eight

8.1. Use the table method to sketch the graphs of

$y = -2x + 1$ *and* $x = 2$ on the Cartesian plane below.   (7)

$$y = -2x + 1$$

x	-1	0	1
y			

$$x = 2$$

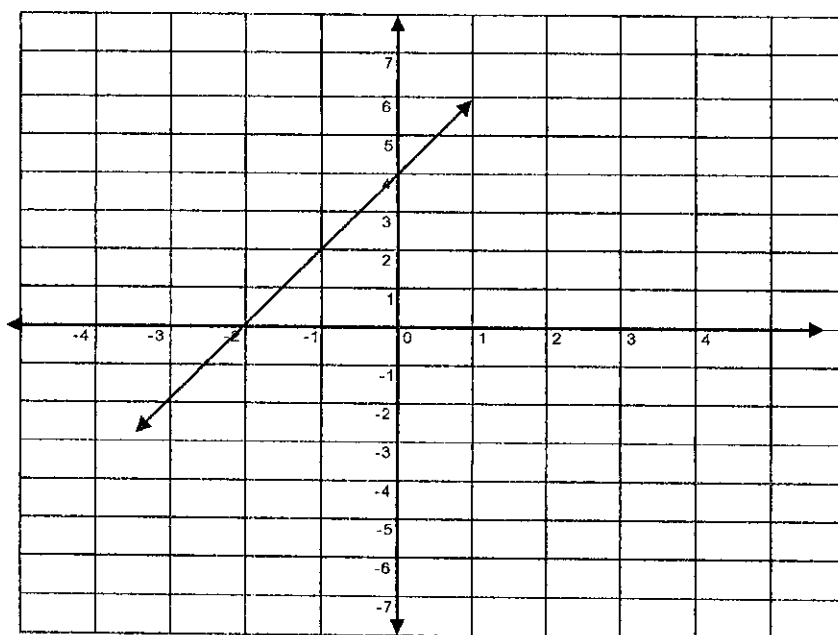| x			
y			

8.2. Write down the **co-ordinates** of the point of intersection of the two graphs.

_____ (2)

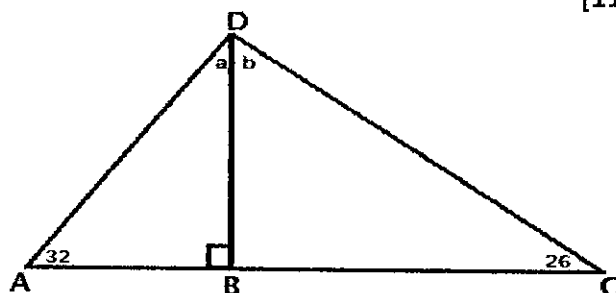8.3 Study the graph below and answer the question that follows.

8.3.1 Determine the **equation** of the graph.
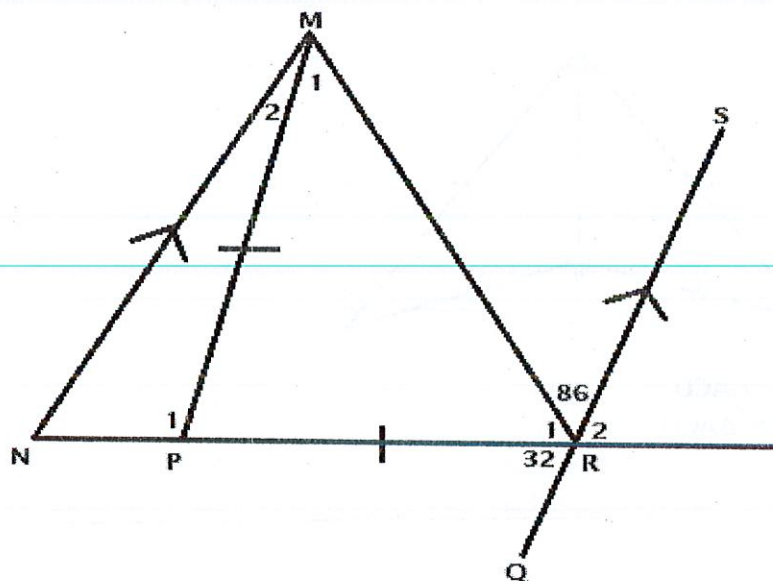
_____(2)

[11]

Question Nine

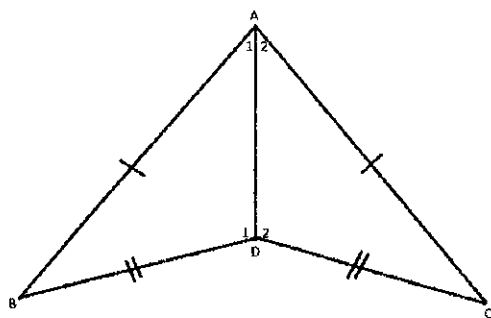9.1. Calculate the values of a ; b and provide reasons to support your answers.

_____

_____

_____

_____

_____

_____(6)

9.2 Given MN ∥ QS ; MP = PR

Calculate the values of R1 ; R2 ; N ; M1 ; M2 ; P1, providing reasons to support your answers.

_____

_____

_____

_____

_____

_____

_____

_____

_____ (13)

9.3 Given AB = AC and BD = DC

R.T.P. : ΔABD ≡ ΔACD
Proof : In ΔABD and ΔACD
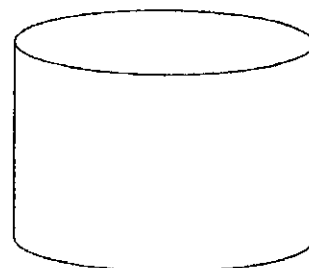
1._____

2._____

3._____

∴ ΔABD ≡ ΔACD . . . _____ (4)

[23]

Question Ten

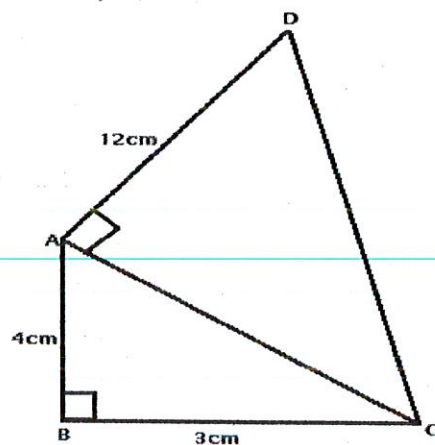The water tank has a radius of 1,5 m and a volume of 24,74m³
10.1. Calculate its height.

Formula : $Volume = \pi r^2 h$ where $(\pi = 3{,}142)$

_____

_____

_____

_____(3)

10.2 Given AB = 4cm, BC = 3cm , AD = 12cm

Determine without measuring the length of Line AC and Line CD

10.2.1   Line AC

_____

_____

_____

_____

_____(3)

10.2.2   Line CD

_____

_____

_____

_____(3)

[9]

STANMORE SECONDARY SCHOOL

MATHEMATICS
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5. Approved scientific calculators (non-programmable) may be used.

Name: MEMO

Grade: 9

Question One – Multiply and Simplify each of the following expressions

1.1. $(2x - 7)(2x + 7)$

$$4x^2 - 49$$

_____ (3)

1.2. $(x - 9)(x + 8)$

$$x^2 + 8x - 9x - 72$$
$$x^2 - 1x - 72$$

(3)

1.3. $(a + 5)^2 - (a - 4)(a - 3)$

$$(a + 5)(a + 5) - (a - 4)(a - 3)$$
$$a^2 + 5a + 5a + 25 - (a^2 - 3a - 4a + 12)$$
$$a^2 + 10a + 25 - (a^2 - 7a + 12) \checkmark$$
$$a^2 + 10a + 25 - a^2 + 7a - 12 \checkmark$$
$$17a + 13$$

(4)

[10]

Question Two - Factorise fully:

2.1. $6x^2y - 3xy + 9xy^2$

$$3xy(2x - 1 + 3y)$$

_____ (2)

2.2. $x^2 - 16x + 64$

$$(x - 8)(x - 8)$$

_____ (2)

2.3. $2x^2 - 162$

$$2(x^2 - 81) \checkmark$$
$$2(x - 9)(x + 9)$$

(3)

2.4. $(2x + 2y) - (dx + dy)$

$$2(x + y) - d(x + y) \checkmark$$
$$(x + y)(2 - d)$$

(3)

[10]

Question Three – Simplify fully

3.1 $\dfrac{5x + 10}{5x}$

$$\frac{5x}{5x} + \frac{10}{5x} \checkmark$$
$$1 + \frac{2}{x} \checkmark$$

_____ (3)

3.2 $\dfrac{3a^2b^3 - 6ab^2c^2 + 4a^2b^2c^2}{-3abc}$

$$\frac{3a^2b^3}{-3abc} - \frac{6ab^2c^2}{-3abc} + \frac{4a^2b^2c^2}{-3abc} \checkmark$$
$$-\frac{ab^2}{c} + 2bc - \frac{4abc}{3}$$

(4)

[7]

Question Four - Solve for x:

4.1. $3(x + 2) - 2(x - 5) - (x - 2) = -2(x + 3) + 12$

$$3x + 6 - 2x + 10 - x + 2 = -2x - 6 + 12 \checkmark$$

$$18 = -2x + 6$$

$$2x = 6 - 18 \checkmark$$

$$2x = -12 \checkmark$$

$$\frac{2x}{2} = \frac{-12}{2} \checkmark$$

$$x = -6 \checkmark$$

(5)

4.2. $x^2 + 6x = 0$

$$x(x + 6) = 0 \checkmark$$

$$x = 0 \quad \text{or} \quad x + 6 = 0$$

$$x = 0 \quad \text{or} \quad x = -6 \checkmark$$

(3)

4.3 $2^x = 64$

$$2^x = 2^6 \checkmark$$

$$x = 6 \checkmark$$

(2)

4.4. $\dfrac{x+3}{4} - \dfrac{x+2}{8} = \dfrac{x}{2} - 1$

$$\frac{2(x+3)}{2 \times 4} - \frac{x+2}{8} = \frac{4(x)}{4(2)} - \frac{8 \times 1}{8 \times 1} \checkmark$$

$$\frac{2x+6}{8} - \frac{x+2}{8} = \frac{4x}{8} - \frac{8}{8}$$

$$2x + 6 - x - 2 = 4x - 8 \checkmark$$

$$x + 4 = 4x - 8$$

$$x - 4x = -8 - 4$$

$$-3x = -12 \checkmark$$

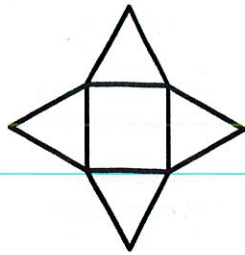$$\frac{-3x}{-3} = \frac{-12}{-3} \checkmark$$
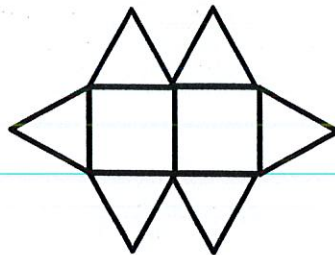
$$x = +4 \checkmark$$
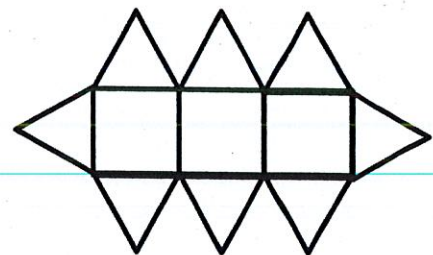
(5)

[15]

Question Five

Zara is making a pattern. She is putting triangles around squares as show in the diagram below.

Pattern 1   Pattern 2   Pattern 3

5.1 Write down the number of squares and triangles that will be in Pattern 4.

Squares: _____ 4 _____   Triangles: _____ 10 _____   (2)

5.2 If Number of Squares in each pattern = x, write down the general rule to calculate the number of triangles in each pattern for the nth pattern.

$$n^{th} = 2x + 2$$
                                                                                    (2)

5.3 Calculate how many Triangles will there be in the 49th term.

$$(49 \times 2) + 2 = 100$$
                                                                                    (2)
                                                                                    [6]

Question Six – Financial Maths

6.1. Thembi wants to invest R6000 for 3 years at 9% interest. She is not sure whether to invest using Simple Interest or Compound Interest. Which way should she invest?
Show all working. Formulae: $A = P(1 + \frac{r}{100})^n$ and $A = P(1 + i)^n$

SI. $A = 6000(1 + \frac{9}{100} \times 3)$ CI. $A = 6000(1 + \frac{9}{100})^3$

    $= 7620$ $= 7770,17$

∴ Invest using Compound Interest
                                                                                    [7]

Grade 9 Mathematics November 2019   Page 4 of 11

6.2. Wesley bought a sound system for R1600. He paid a 15 % deposit.

6.2.1. Calculate the amount of the deposit paid.

$$Deposit = 1600 \times \frac{15}{100} \checkmark$$
$$= 240 \quad \checkmark$$

(2)

6.2.2. How much does he still owe on the sound system (balance)?

$$Balance = 1600 - 240$$
$$= 1360 \quad \checkmark$$

(1)

6.2.3. He takes out a hire purchase loan to repay the balance. 13% p.a. simple interest is being charged and the amount must be repaid monthly over 3 years.

6.2.3.1. Calculate the total amount he must pay in the next 3 years.

$$A = 1360 \left(1 + \frac{13}{100} \times 3\right) \quad OR \quad A = 1360 \times \frac{13}{100} \times 3 \checkmark$$
$$= R1890,40 \checkmark \qquad\qquad = 530,40 \checkmark$$
$$Total = 1360 + 530,40$$
$$= R1890,40 \checkmark$$

(3)

6.2.3.2. Calculate the monthly payment.

$$Monthly\ Payment = \frac{1890,40}{36} \checkmark$$
$$= R52/M \checkmark \quad 52,51$$

(2)

[15]

Question Seven

A survey amongst 20 learners showed that they spent the following amount of their pocket money while on an excursion:

47	31	42	33	52	75	56	86	72	40
25	28	42	30	70	31	76	31	48	25

7.1 Arrange the data in ascending order. ✓

25, 25, 28, 30, 31, 31, 31, 33, 40, 42, 42, 47, 48, 52, 56, 70, 72, 75, 76, 86

(1)

7.2 Determine the following:

7.2.1 The mode

$$31 \checkmark$$

(1)

7.2.2 The median

$$\frac{42+42 \checkmark}{2} = 42 \checkmark$$

(2)

7.2.3 The range

$$86 - 25 = 61 \checkmark \checkmark$$

(2)

7.2.4 The mean

$$\frac{940}{20} \checkmark$$
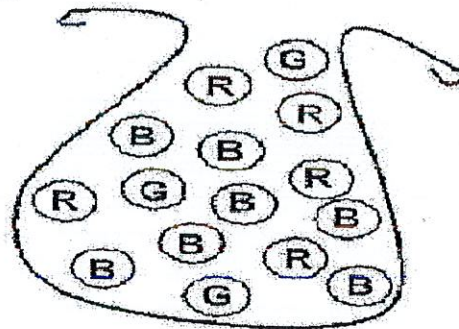
$$= 47 \checkmark$$

(2)
[8]

7.3 The bag contains marbles of different colours.
R – Red; G – Green; B – Blue.
One marble is picked randomly.
Determine the probability that:

7.1 a red marble is picked.

$$\frac{5}{15} \checkmark = \frac{1}{3} \checkmark$$

(2)

7.2. a green or blue marble is picked.

$$\frac{10}{15} \checkmark = \frac{2}{3} \checkmark$$

(2)

7.3. a yellow marble is picked.

$$0 \checkmark \checkmark$$

(2)
[6]

Question Eight

8.1. Use the table method to sketch the graphs of

$y = -2x + 1$ *and* $x = 2$ on the Cartesian plane below. (7)

$$y = -2x + 1$$

x	-1	0	1
y	3 ✓	1 ✓	-1 ✓

$$x = 2$$

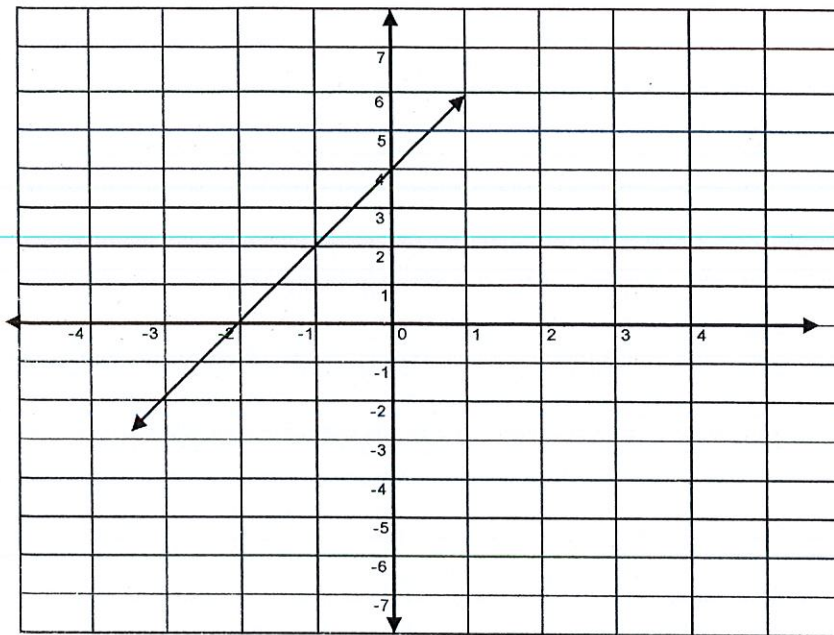| x			
	2	2	2
y			
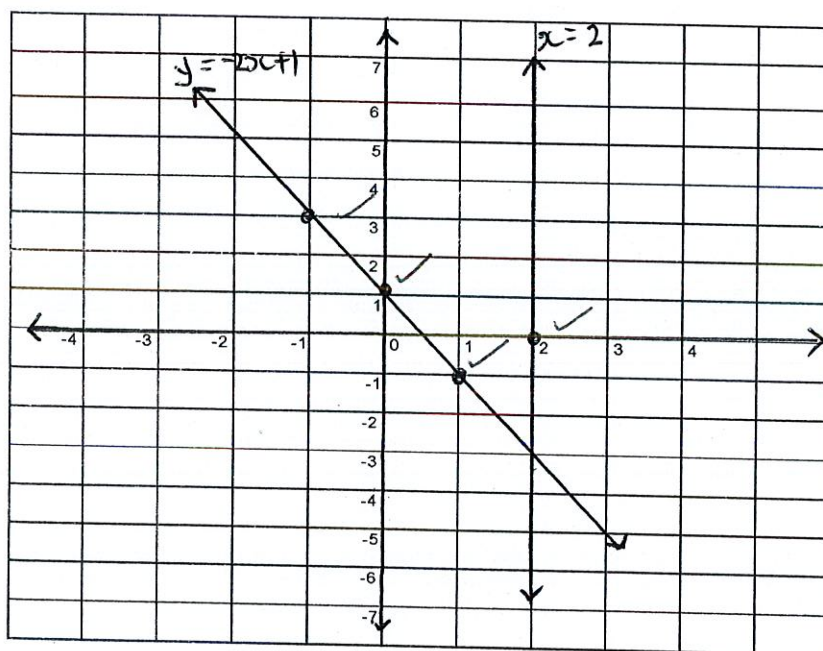
8.2. Write down the **co-ordinates** of the point of intersection of the two graphs.

$(2 ; -3)$ (2)

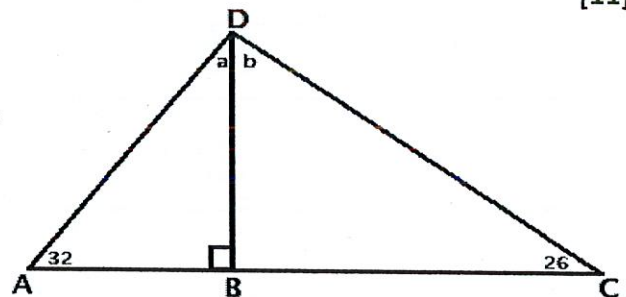8.3 Study the graph below and answer the question that follows.

8.3.1 Determine the **equation** of the graph.

$$y = 2x + 4$$

_____(2)

[11]

Question Nine

9.1. Calculate the values of a ; b and provide reasons to support your answers.

$a = 180 - (90 + 32)$ sum of $\angle$'s of $\triangle$

$= 58$ ✓

$b = 90 - 26$ ✓   ext $\angle$'s of $\triangle$ $b = 180 - 90 - 26 = 64$

$= 64$ ✓   (sum of $\angle$'s of $\triangle$)

_____(6)

9.2 Given MN ∥ QS ; MP = PR
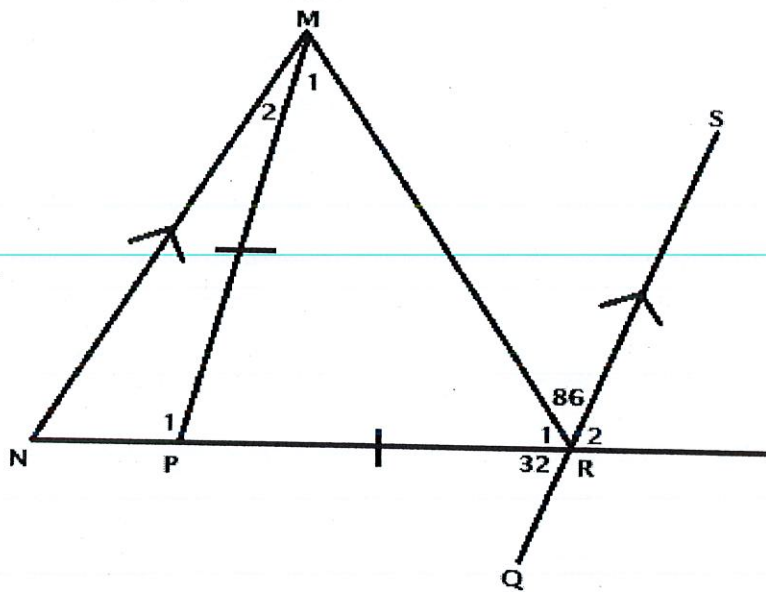
Calculate the values of R1 ; R2 ; N ; M1 ; M2 ; P1, providing reasons to support your answers.

$\hat{R_1} = 180 - (86 + 32)$ ✓   adj. supp. ∠'s

     = 62 ✓

$\hat{R_2} = 32$ ✓   vert. opp. ∠'s

$\hat{N} = 32$ ✓   corresp ∠'s ✓

$\hat{M_1} = 62$ ✓   isosceles △ ✓

$\hat{M_2} = 86 - 62$ alt. ∠'s ✓

     = 24 ✓

$\hat{P_1} = 62 + 62$ ext ∠'s of △

     = 124 ✓

         OR   (13)

$\hat{P_1} = 180 - (32 + 24)$ sum of ∠'s of △

     = 124

9.3 Given AB = AC and BD = DC
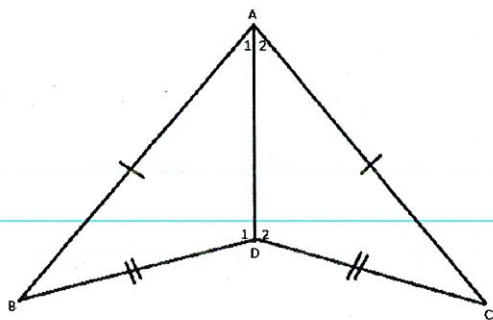
R.T.P.: ΔABD ≡ ΔACD
Proof : In ΔABD and ΔACD

1. AB = AC   given ✓
2. BD = CD   given ✓
3. AD is common   ✓

∴ ΔABD ≡ ΔACD ... S,S,S ✓   (4)

                                                        [23]

Question Ten

The water tank has a radius of 1,5 m and a volume of 24,74m³
10.1. Calculate its height.

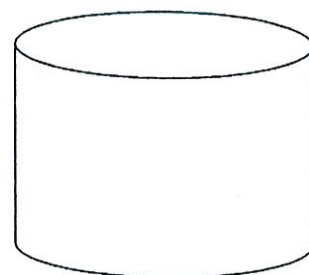Formula : $Volume = \pi r^2 h$ where $(\pi = 3,142)$

$$h = \frac{24,74}{3,142 \times 1,5^2} \checkmark\checkmark$$
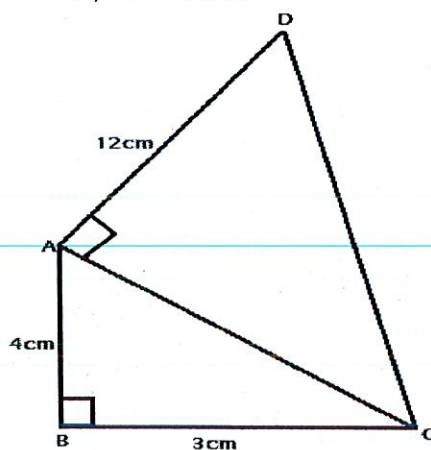
$$= 3,49\ m$$

$$\approx 3,5\ m \quad\checkmark$$

                                                        (3)

10.2 Given AB = 4cm, BC = 3cm , AD = 12cm

Determine without measuring the length of Line AC and Line CD

10.2.1 Line AC

$$AC^2 = 4^2 + 3^2 \checkmark$$

$$AC^2 = 16 + 9$$

$$AC^2 = 25$$

$$AC = \sqrt{25} \checkmark$$

$$= 5 \, cm \checkmark$$

(3)

10.2.2 Line CD

$$CD^2 = 12^2 + 5^2 \checkmark$$

$$CD^2 = 144 + 25$$

$$CD^2 = 169$$

$$CD = \sqrt{169} \checkmark$$

$$= 13 \, cm \checkmark$$

(3)

[9]