Mathematics Gr.8 June Exam Question paper (0001) Memo

Time: 2H **Total: 100 marks**

Section A (Algebra): [75]

Question 1: [10]

1.1 Write down the factors of 18 which are also prime numbers. (2)

$F_{18} = \{1; 2; 3; 6; 9; 18\}$

Prime numbers : 2 ✓ and 3 ✓

1.2 Is 4 015 divisible by 11? Motivate your answer. (2)

4 015 → 5 − 5 ✓ = 0 ✓

∴ 4 015 is divisible ✓ by 11

1.3 (a) Determine the prime factors of 3 375. (2)

5	3 375
5	675
5	135
3	27
3	9
3	3
	1

∴ $3\,375 = 5^{3} \times 3^{3}$ ✓✓

(b) Calculate, without using a calculator: $\sqrt[3]{3\,375}$ (3)
Show all calculations.

$\sqrt[3]{3\,375}$

$= \sqrt[3]{5^{3} \times 3^{3}}$

$= 5 \times 3$ ✓

$= 15$ ✓

1.4 Find the LCM of 8 and 12. (1)

$M_8 = \{8; 16; 24; 32; 40; ...\}$

$M_{12} = \{12; 24; 36; ...\}$

$LCM = 24$

Question 2: [10]

2.1 If $p = -2$ and $t = 5$, calculate, without using a calculator:
[Show all calculations.]

(a) $t^2 - p^3$ (3)

$= (5)^2 - (-2)^3$

$= 25 - (-8)$

$= 25 + 8$

$= 33$

(b) $\sqrt{-p} \times \sqrt{(t+3)}$ (3)

$= \sqrt{-(-2)} \times \sqrt{(5+3)}$

$= \sqrt{2} \times \sqrt{8}$

$= \sqrt{16}$

$= 4$

2.2 Are the following statements true or false? (4)
If false, write down the correct statement.

(a) $(5^2)^4 = 5^6$

False ✓

$(5^2)^4 = 5^{2\times4} = 5^8$ ✓

(b) $(-3)^3 = -3^3$

True ✓✓

$(-3)^3 = (-3)(-3)(-3) = (-)(-)(-)(3)(3)(3) = -3^3$

Question 3: [10]

3.1 Simplify the following by using exponential laws:
[Write your answers as positive exponents.]

(a) $5x^0y^2$ (2)

$= 5(1)y^2$ ✓

$= 5y^2$ ✓

(b) $\dfrac{x^6y^{10} \div x^2y^5}{x^2y^1}$ (3)

$= \dfrac{x^{6-2} \cdot y^{10-5}}{x^2y}$ ✓

$= x^{4-2} \cdot y^{5-1}$ ✓

$= x^2y^4$ ✓

(c) $(mn^{-2})^{-3}$ (3)

$= m^{-3}n^6$ ✓

$= \dfrac{n^6}{m^3}$ ✓

3.2 Write the following in scientific notation: 18 million (2)

18 million

= 18 000 000

= $1,8 \times 10^{7}$

Question 4: [15]

4.1 Consider the following sequence: -3 ; - 9 ; -15 ; -21 ; .....

(a) Write the pattern of the sequence in words. (1)

Subtract 6

(b) Determine the general term of the sequence in the format T_n = ... (3)

$T_n = -6n + k$

$T_1 = -6(1) + k = -3$

$-6 + k = -3$

$k = -3 + 6$

$k = 3$

$\therefore T_n = -6n + 3$

(c) Determine the 85th term. (2)

$T_n = -6n + 3$

$T_{85} = -6(85) + 3$

$T_{85} = -507$

(d) Which term in the sequence is equal -75? (2)

$T_n = -6n + 3$

$-75 = -6n + 3$

$6n = 3 + 75$

$6n = 78$

$n = \frac{78}{6}$

$n = 13$

$\therefore T_{13} = -75$

4.2 Fill in the missing numbers: (2)

2 ; 6 ; 18 ; 54 ; 162 ; 486 ; 1458 (x3)

4.3 (a) Complete the following table: (2)

n	1	3	4	5	8	10	99
T_n	3	7	9	11	17	21	199

+2 +2

(b) Write a rule for the relation between n and T_n in the format T_n = ... (3)

$T_n = 2n + k$

$T_3 = 3(2) + k = 7$

$k = 7 - 6$

$k = 1$ $\therefore T_n = 2n + 1$

Question 5: [16]

5.1 Consider the following expression: $5x + 7y - 3 + 4(x + y^2)$

(a) How many terms does the expressions have? (1)

4 terms

(b) Write down the coefficient of y. (1)

+7

(c) Write down the constant term. (1)

−3

5.2 Simplify:

(a) $4m + 3mn - 2m^2 + 5m - 8m^2$ (1)

$= 9m + 3mn - 10m^2$

(b) $2(3x^2 - 7xy) - 3x(y - 2x)$ (4)

$= 6x^2 - 14xy - 3xy + 6x^2$

$= 12x^2 - 17xy$

(c) $\frac{15ab^{12} + 3ab^2}{3ab^2}$ (2)

$= \frac{15ab^{12}}{3ab^2} + \frac{3ab^2}{3ab^2}$

$= 5b^{10} + 1$

(c) $\sqrt{64p^{16} + 36p^{16}}$ (3)

$= \sqrt{100p^{16}}$

$= \sqrt{100}\ \sqrt{p^{16}}$

$= 10\ p^{\frac{16}{2}}$

$= 10p^8$

5.3 How much is $(6k + 3)$ greater than $(17k - k^2 - 5)$? (3)

$\therefore (6k+3) - (17k - k^2 - 5)$

$= 6k + 3 - 17k + k^2 + 5$

$= -11k + 8 + k^2$

Question 6: [14]

6.1 Solve the following equations:

(a) $5k + 3 = 7k - 3$ (1)

$5k - 7k = -3 - 3$

$-2k = -6$

$k = \frac{-6}{-2}$

$k = 3$ ✓

(b) $\frac{y}{3} + 1 = 4$ (2)

$\frac{y}{3} = 4 - 1$

$\frac{y}{3} = 3$ ✓

$\frac{y}{3} \times \frac{3}{1} = 3 \times 3$

$y = 9$ ✓

(c) $8 + \overbrace{2(x - 1)} + x^2 = \overbrace{x(3 + x)}$ (5)

$8 + 2x - 2 + x^2 = 3x + x^2$ ✓ ✓

$2x + x^2 + 6 = x^2 + 3x$

$2x + x^2 - x^2 - 3x = -6$ ✓

$-x = -6$

$x = 6$ ✓

6.2 Check whether $x = -2$ is a possible solution for: $\frac{3}{x^2} - 2 = \frac{-5}{2x}$ (3)

$LHS = \frac{3}{x^2} - 2$

$= \frac{3}{(-2)^2} - 2$

$= \frac{3}{4} - 2$

$= -\frac{5}{4}$ ✓

$RHS = \frac{-5}{2x}$

$= \frac{-5}{2(-2)}$

$= \frac{-5}{-4}$

$= \frac{5}{4}$ ✓

$\therefore LHS \neq RHS$

$\therefore x \neq -2$ ✓

6.3 In a class of 31 learners, there are 5 more boys than girls. (3)
Calculate the number of boys in the class.

Assume there are x boys in the class.

$\therefore$ the are $(x-5)$ girls ✓

but $B + G = 31$

$\therefore x + (x-5) = 31$

$x + x - 5 = 31$ ✓

$2x - 5 = 31$

$2x = 31 + 5$

$2x = 36$

$x = \frac{36}{2}$

$x = 18$

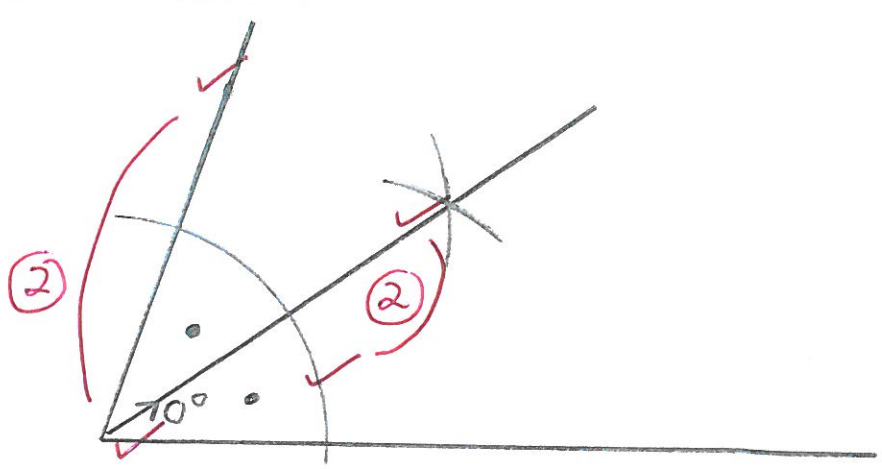
$\therefore$ There are 18 boys ✓ in the class

Section B (Geometry): [25]

Question 7: [4]

7.1 Use a compass, pencil, ruler and protractor and construct $A\hat{B}C = 70°$. (2)

7.2 Use a compass, ruler and pencil to bisect $A\hat{B}C$. (2)



Question 8: [15]

8.1 Complete the following:

(a) The supplement of 25° is 155° (1)

(b) The complement of 25° is 65° (1)

(c) Adjacent angles on a straight line

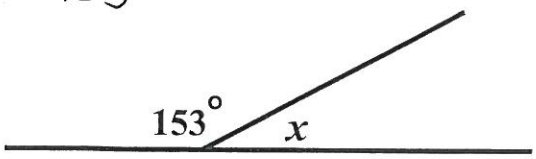
add up 180° / are supplementary (1)

8.2 Find the value(s) of x and / or y in each of the following sketches. (9)
Give reasons.

(a) $153^\circ + x = 180^\circ$ [$\angle$s on str. line]

$\therefore x = 180^\circ - 153^\circ$

$\therefore x = 27^\circ$



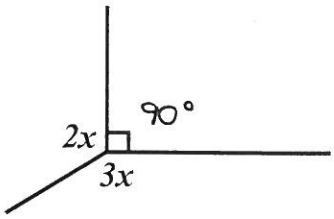
(b) $2x + 3x + 90^\circ = 360^\circ$ [revolution]

$5x = 360^\circ - 90^\circ$

$5x = 270^\circ$

$x = \frac{270^\circ}{5}$

$\therefore x = 54^\circ$



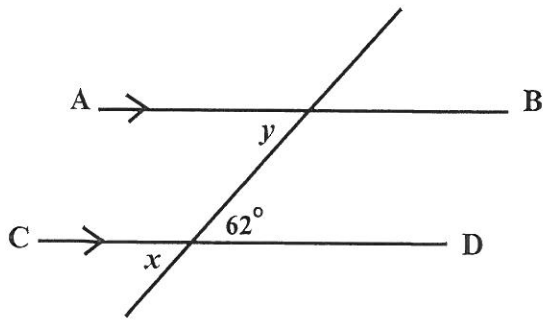
(c) $x = 62^\circ$

[Vert. opp. $\angle$s]

$x = y = 62^\circ$

[corresp. $\angle$s; AB // CD]

or [altern. $\angle$s; AB // CD]



8.3 Each of the following statements are faulty. Write down the correct statement.

(a) Alternate angles are always equal. (1)

Alternate angles are equal if the lines are parallel. ✓

(b) Halve of a right angle is equal to 90°. (1)

Halve of a right angle is ✓45° ✓

(c) A reflex angle is smaller than 360°. (1)

A reflex angle is greater than 180° and smaller than 360° ✓

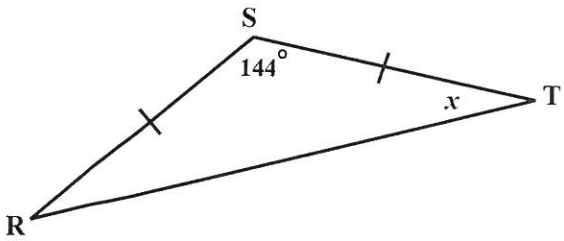
Question 9: [6]

9.1 Give two properties of an isosceles triangle. (2)

Two angles are equal ✓

The sides opposite the equal ✓ angles are equal.

9.2 Find the value of x in the following sketch. Give reasons. (4)



$\hat{R} = x$ ✓ [$\angle$s opp equal ✓ sides]

but $144° + x + x = 180°$

[int. $\angle$s of $\triangle$ ✓]

$2x = 180° - 144°$

$2x = 36°$ ✓

$x = \frac{36°}{2} = 18°$