

SHARP

June Exam 2014 Memorandum

Grade 9 Mathematics

Marks: 150

Time: 2 hours

Question 1 [35]

1.1. For each number in the table tick the correct columns:

Number	Real	Non-Real	Rational	Irrational	Integer	Whole	Natural
0	√		√		√	√	
$\sqrt{-3}$		√					
$\sqrt[3]{-64}$	√		√		√		
13	√		√		√	√	√
$\sqrt{7}$	√			√			

One mark per correct line

(5)

1.2. 1.2.1. $\begin{array}{l|l} 220 & 2 \\ \hline 110 & 2 \\ 55 & 5 \\ 11 & 11 \\ 1 & \end{array}$ and $\begin{array}{l|l} 495 & 5 \\ \hline 99 & 3 \\ 33 & 3 \\ 11 & 11 \\ 1 & \end{array}$ (2)

HCF = $5 \times 11 = 55$ ✓

LCM = $2 \times 2 \times 5 \times 11 \times 3 \times 3 = 1\ 980$ ✓

1.2.2. $\begin{array}{l|l} 450 & 2 \\ \hline 225 & 5 \\ 45 & 5 \\ 9 & 3 \\ 3 & 3 \\ 1 & \end{array}$ and $\begin{array}{l|l} 465 & 5 \\ \hline 93 & 3 \\ 31 & 31 \\ 1 & \end{array}$ (2)

HCF = $5 \times 3 = 15$ ✓

LCM = $2 \times 5 \times 5 \times 3 \times 3 \times 31 = 13\ 950$ ✓

1.3. 1.3.1. $(-3)^2 + 9$ (2)

$= 9 + 9$ ✓

$= 18$ ✓

1.3.2. $-4(-5) + (-10) + 0$ (2)

$= 20 - 10$ ✓

$= 10$ ✓



$$1.3.3. \sqrt[3]{-27} - (-3) \quad (2) \quad 1.3.4. \frac{42}{-7} + 5(-2) - 3 \quad (2)$$

$$= -3 + 3 \quad \checkmark \quad = -6 - 10 - 3 \quad \checkmark$$

$$= 0 \quad \checkmark \quad = -19 \quad \checkmark$$

$$1.3.5. \sqrt{0.36} \quad (2) \quad 1.3.6. \frac{1}{4} + \left(\frac{3}{2}\right)^2 - \sqrt{\frac{9}{16}} \quad (3)$$

$$= \sqrt{\frac{36}{100}} \quad \frac{1}{2} \text{ mark} \quad = \frac{1}{4} + \frac{9}{4} - \frac{3}{4} \quad \checkmark\checkmark$$

$$= \frac{6}{10} \quad \checkmark \quad = \frac{7}{4} \text{ or } 1\frac{3}{4} \quad \checkmark$$

$$= 0.6 \quad \frac{1}{2} \text{ mark}$$

1.4 Find the missing values in the table and write down the letter and the answer on your answer sheet.

a)	0.6	$\frac{1}{2}$ mark	b)	60%	$\frac{1}{2}$ mark	(5)
c)	$\frac{3}{20}$	$\frac{1}{2}$ mark	d)	15%	$\frac{1}{2}$ mark	
e)	$1\frac{1}{50}$ or $\frac{51}{50}$	$\frac{1}{2}$ mark	f)	1.02	$\frac{1}{2}$ mark	
g)	$\frac{19}{25}$	$\frac{1}{2}$ mark	h)	76%	$\frac{1}{2}$ mark	
i)	0.3333	$\frac{1}{2}$ mark	j)	33.33%	$\frac{1}{2}$ mark	

$$1.5. \quad 1.5.1. \quad \frac{1}{4} = \frac{65}{260} \quad \checkmark \quad (1)$$

$$1.5.2. \quad \frac{260}{260} - \frac{65}{260} - \frac{120}{260} \quad \checkmark \quad (2)$$

$$= \frac{75}{260} \quad \frac{1}{2} \text{ mark}$$

$$= \frac{15}{52} \quad \frac{1}{2} \text{ mark}$$

$$1.5.3. \quad \frac{120}{260} \times 100 \quad \checkmark \quad (2)$$

$$= \frac{6}{13} \times 100$$

$$= \frac{600}{13}$$

$$= 46.15\% \quad \checkmark$$



1.5.4. 260 + 15% of 260

(3)

$$\begin{aligned} \therefore \frac{15}{100} \times 260 & \quad \checkmark \\ = \frac{3}{20} \times \frac{260}{1} & \\ = 3 \times 13 & \\ = 39 & \end{aligned}$$

$$\therefore \text{Desiree's money increases to } R260 + 39 \checkmark = R299. \checkmark$$

[35]

Question 2 [10]

2.1. 2.1.1. $\frac{x^2y^3}{(x^0z)^3} \div \frac{x^{-4}y^6}{x^3y^{-7}}$ (2)

$$= \frac{x^2y^3}{z^3} \times \frac{x^3y^{-7}}{x^{-4}y^6} \quad \frac{1}{2} \text{ mark}$$

$$= \frac{x^5y^{-4}}{x^{-4}y^6z^3} \quad \frac{1}{2} \text{ mark}$$

$$= \frac{x^9}{y^{10}z^3} \quad \checkmark$$

2.1.2. $\left(\frac{x}{y} + \frac{y}{x}\right)^{-1}$ (2)

$$= \left(\frac{x^2+y^2}{xy}\right)^{-1} \quad \checkmark$$

$$= \frac{xy}{x^2+y^2} \quad \checkmark$$

2.2. 2.2.1. 3 212 (1)

$$= 3.212 \times 10^3 \quad \checkmark$$

2.2.2. 785 148 000 (1)

$$= 7.85148 \times 10^8 \quad \checkmark$$

2.3. 2.3.1. 8.13×10^{-9} (1)

$$= 0.00000000813 \quad \checkmark$$

2.3.2. 3.675×10^{-2} (1)

$$= 367.5 \quad \checkmark$$

2.4. $4.87 \times 10^5 + 6 \times 10^4$ (2)

$$= 48.7 \times 10^4 + 6 \times 10^4 \quad \checkmark$$

$$= 54.7 \times 10^4 \quad \frac{1}{2} \text{ mark}$$

$$= 5.47 \times 10^5 \quad \frac{1}{2} \text{ mark}$$

[10]

Question 3 [17]

3.1.	3.1.1.	Ella:	25c	50c	R1	R2	R4	R8	\checkmark (2)
			x 2	x 2	x 2	x 2	x 2		
		Greg:	50c	R1	R1.50	R2	R2.50	R3	\checkmark
			+50c	+50c	+50c	+50c	+50c		



3.1.2. Multiply \checkmark the previous amount by two \checkmark to get the next amount. (2)

3.1.3. Add 50c $\checkmark\checkmark$ to the previous amount to get the next amount. (2)

3.1.4. R8 x 2 = 16 \checkmark (3)

It will take Ella 7 weeks to pay R16 \checkmark

Therefore it will take her 8 weeks to pay **more** than R16. \checkmark

3.2. 3.2.1. \checkmark \checkmark

Week	1	2	3	4	8	11	20	25
Total Hours	$4\frac{1}{4}$	$8\frac{1}{2}$	$12\frac{3}{4}$	17	34	$46\frac{3}{4}$	85	$106\frac{1}{4}$

One mark per correct entry in the table \checkmark \checkmark \checkmark (5)

3.2.2.  (3)

Axes labelled \checkmark
 At least 3 points correct \checkmark
 The relationship between the points is linear – a straight line \checkmark

[17]

Question 4

4.1. Simplify the following:

4.1.1. $(4x - y)(4x + 3y)$ (2)

$= 16x^2 + 12xy - 4xy - 3y^2$ \checkmark

$= 16x^2 + 8xy - 3y^2$ \checkmark

4.1.2. $\frac{3x-6}{2x} \times \frac{3x^2}{5x-10}$ (3)

$= \frac{3(x-2)}{2x} \times \frac{3x^2}{5(x-2)}$ $\checkmark\checkmark$

$= \frac{9x}{10}$ \checkmark



$$4.1.3. \frac{3x+5}{9x^2-25} \div \frac{3x}{9x^2-15x} \quad (3)$$

$$= \frac{3x+5}{(3x-5)(3x+5)} \times \frac{3x(3x-5)}{3x} \quad \checkmark\checkmark$$

$$= 1 \quad \checkmark$$

4.2. Solve for x in the following:

$$4.2.1. x^2 + 10x + 24 = 0 \quad (2)$$

$$(x + 4)(x + 6) = 0 \quad \checkmark$$

$$\therefore x = -4 \text{ or } x = -6 \quad \checkmark$$

$$4.2.2. 3(x - 7) = 5x + 11 \quad (2)$$

$$3x - 21 = 5x + 11 \quad \checkmark$$

$$3x - 5x = 11 + 21$$

$$-2x = 32$$

$$x = -16 \quad \checkmark$$

$$4.2.3. x^2 + 7x + 6 = 0 \quad (2)$$

$$(x + 1)(x + 6) = 0 \quad \checkmark$$

$$\therefore x = -1 \text{ or } x = -6 \quad \checkmark$$

$$4.2.4. \frac{3x}{5} + 4 = 19 \quad (3)$$

$$\frac{3x}{5} = 19 - 4 \quad \checkmark$$

$$\frac{3x}{5} \times 5 = 15 \times 5$$

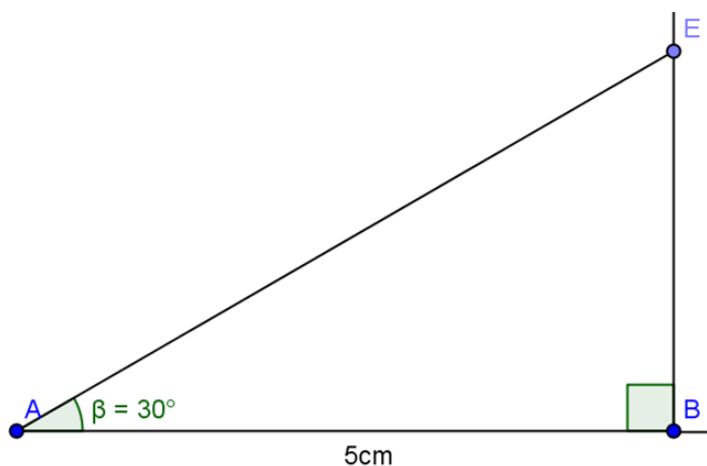
$$3x \div 3 = 75 \div 3 \quad \checkmark$$

$$x = 25 \quad \checkmark$$

[17]

Question 5

5.1.



line must be 5cm in length \checkmark (7)

For 30° angle:

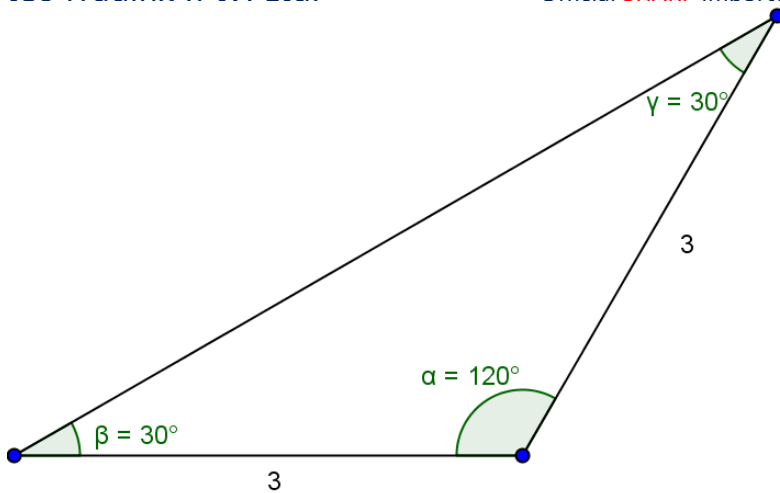
- 3 arcs $\checkmark\checkmark$
- Line making 30° & angle measures 30° \checkmark

For right angle:

- 4 arcs $\checkmark\checkmark$
- Perpendicular line drawn and 90° angle marked. \checkmark



5.2.



2 sides equal to 3cm ✓✓ (6)

Constructing an angle of 120° between the two 3cm sides ✓✓

Other 2 angles equal to 30° each ✓✓

[13]

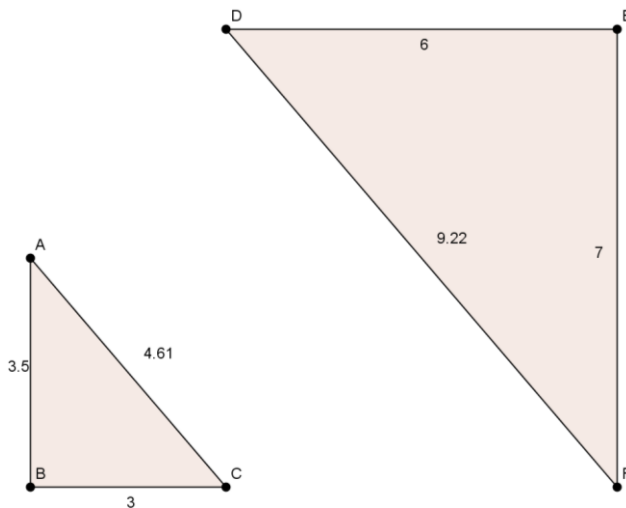
Question 6

6.1. any 4 of the following: (4)

- All four sides are equal ✓
- Both pairs opposite sides are parallel ✓
- Both pairs opposite angles equal ✓
- Diagonals bisect each other at 90° ✓
- Diagonals bisect both pairs of opposite angles. ✓

6.2. Prove the following triangles similar:

6.2.1.

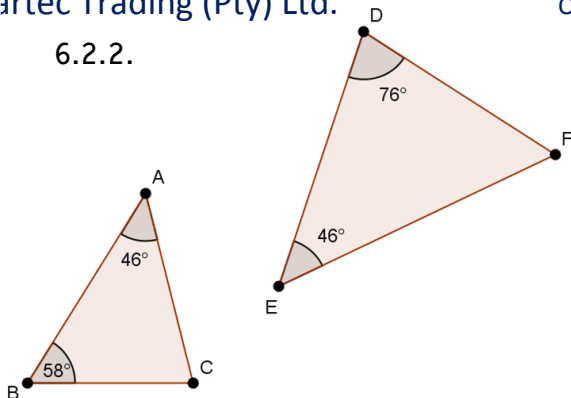


$$\frac{AB}{EF} = \frac{BC}{DE} = \frac{AC}{DF} = \frac{1}{2} \quad \checkmark\checkmark\checkmark \quad (4)$$

∴ ΔABC ||| ΔDEF because the sides are in proportion. ✓

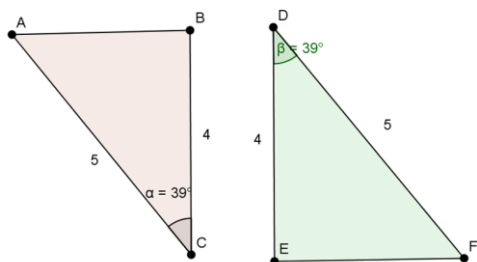


6.2.2.



- In ΔABC and ΔDEF (4)
1. $\hat{A} = \hat{E}$ given \checkmark
 2. $\hat{B} = \hat{F}$ Angles in $\Delta = 180^\circ$ \checkmark
 3. $\hat{C} = \hat{D}$ 3rd angle in Δ \checkmark
- $\therefore \Delta ABC \equiv \Delta FED$ (A,A,A) \checkmark

6.3.



- In ΔABC and ΔDEF (4)
1. $AC = DF$ both equal to 5/given \checkmark
 2. $BC = DE$ both equal to 4/given \checkmark
 3. $\hat{C} = \hat{D}$ given \checkmark
- $\therefore \Delta ABC \equiv \Delta FED$ (S,A,S) \checkmark

6.4. Say whether the following are true or false:

6.4.1. When all three angles in a triangle are equal the triangle is an isosceles triangle.

False \checkmark (1)

6.4.2. The angles in a square add up to 380° .

False \checkmark (1)

6.4.3. A square is also a rectangle.

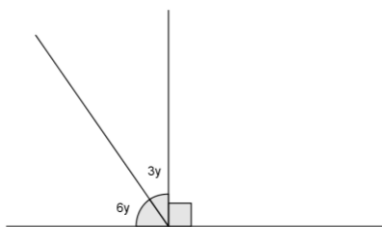
True \checkmark (1)

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Question 7

Find the values of the variables in these diagrams with reasons:

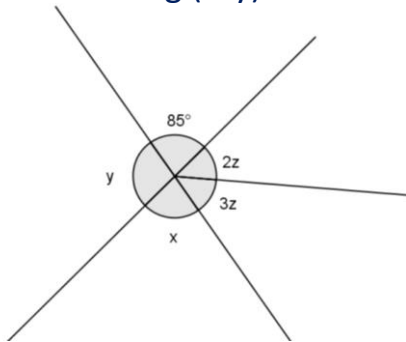
7.1.



- $3y + 6y = 90^\circ$ Complementary \checkmark (3)
- $\therefore 9y = 90^\circ$ \checkmark
- $\therefore y = 10^\circ$ \checkmark

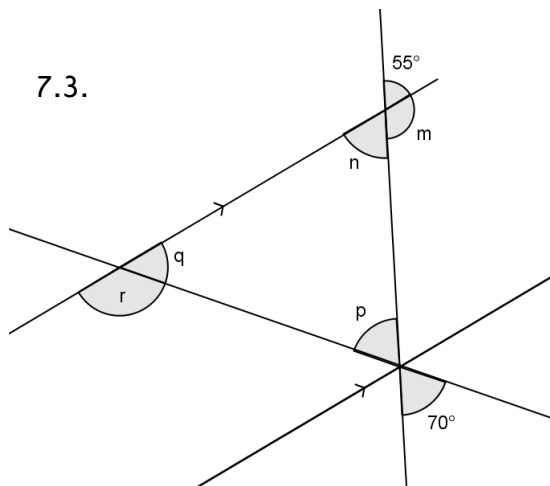


7.2.



$85^\circ + y = 180$	angles on a straight line	✓✓	(7)
$\therefore y = 180^\circ - 85^\circ$			
$\therefore y = 95^\circ$		✓	
$x = 85^\circ$	vertically opp angles equal	✓✓	
$2z + 3z + 85^\circ = 180^\circ$	angles on straight line	✓	
$5z = 95^\circ$			
$\therefore z = 19^\circ$		✓	

7.3.

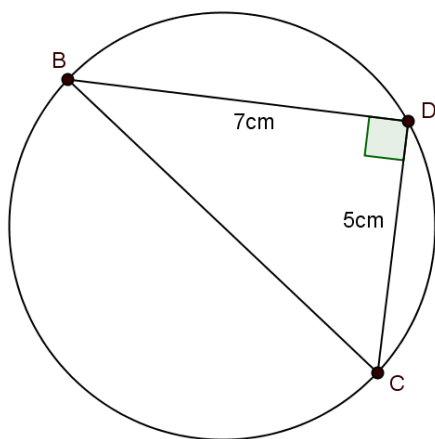


$m + 55^\circ = 180^\circ$	angles on a straight line	✓	(8)
$\therefore m = 180^\circ - 55^\circ$			
$\therefore m = 125^\circ$		✓	
$n = 55^\circ$	vertically opposite angles	✓	
$p = 70^\circ$	vertically opposite angles	✓	
$q + 70^\circ + 55^\circ = 180^\circ$	angles in $\Delta = 180^\circ$	✓	
$q = 180^\circ - 125^\circ$			
$q = 55^\circ$		✓	
$r + 55^\circ = 180^\circ$	angles on a straight line	✓	
$r = 125^\circ$		✓	

[18]

Question 8

8.1.



8.1.1. $BC^2 = BD^2 + CD^2$ ½ mark (2)

$BC^2 = (7)^2 + (5)^2$ ½ mark

$BC^2 = 49 + 25$

$BC^2 = 74$

$BC = \sqrt{74}$

$BC = 8.6$

✓

8.1.2. $Area = \frac{1}{2}b \times h$ (2)

$Area = \frac{1}{2} \times 5 \times 7$ ✓

$Area = 17.5 \text{ cm}^2$ ✓

8.1.3. Area of Circle = πr^2 (3)

$= \pi(4.3)^2$ ✓

$= 58.09 \text{ cm}^2$ ✓

Area not covered by $\Delta BCD = 58.09 - 17.5$

$= 40.59 \text{ cm}^2$



$$\begin{aligned}
 8.1.4. \text{ Circumference} &= 2\pi r && (2) \\
 &= 2\pi(4.3) && \checkmark \\
 &= 27.02 \text{ cm} && \checkmark
 \end{aligned}$$

$$8.2. \quad 8.2.1. \text{ Perimeter} = 4l \quad (1)$$

$$\begin{aligned}
 48\text{mm} &= 4l \\
 \therefore l &= 12\text{mm} && \checkmark
 \end{aligned}$$

$$8.2.2. \text{ Area} = l^2 \quad (2)$$

$$\begin{aligned}
 &= 12^2 && \checkmark \\
 &= 144 \text{ mm}^2 && \checkmark
 \end{aligned}$$

$$8.2.3. \text{ diagonal}^2 = l^2 + l^2 \quad \checkmark \text{ for using Pythagoras} \quad (3)$$

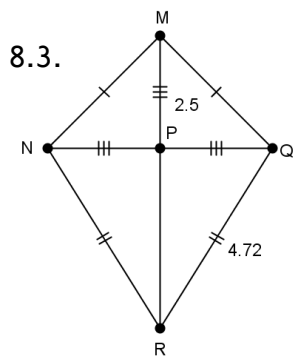
$$D^2 = 12^2 + 12^2 \quad \checkmark$$

$$D^2 = 144 + 144$$

$$D^2 = 288$$

$$D = \sqrt{288}$$

$$D = 16.97 \text{ mm} \quad \checkmark$$



$$8.3.1. \text{ } MQ^2 = MP^2 + PQ^2 \quad (2)$$

$$MQ^2 = (2.5)^2 + (2.5)^2 \quad \checkmark$$

$$MQ^2 = 12.5$$

$$MQ = \sqrt{12.5}$$

$$MQ = MN = 3.54 \text{ units} \quad \checkmark$$

$$8.3.2. \text{ } QR^2 = PR^2 + PQ^2 \quad (2)$$

$$PR^2 = QR^2 - PQ^2 \quad \frac{1}{2} \text{ mark for rearranging formula.}$$

$$PR^2 = (4.72)^2 - (2.5)^2 \quad \frac{1}{2} \text{ mark for substituting}$$

$$PR^2 = 16.0284$$

$$PR = \sqrt{16.0284}$$

$$PR = 4 \text{ units} \quad \checkmark$$

$$8.3.4. \text{ Area of kite} = \frac{1}{2} \times \text{diagonal}_1 \times \text{diagonal}_2 \quad \checkmark \quad (2)$$

$$= \frac{1}{2} \times (2.5 + 4) \times (2.5 + 2.5)$$

$$= \frac{1}{2} \times 6.5 \times 5$$

$$= 16.25 \text{ units}^2 \quad \checkmark$$

*Note: The area of the kite can also be found by finding the area of all 4 triangles and adding them together.

[21]

Grand Total: [150]

