November Exam Memorandum

Grade 8 Mathematics

Marks: 150

Time: 2 hours

Please Note

Read the following instructions carefully before answering the questions:

1. This answer paper consists of 12 pages and 2 sections.
2. There are other possible ways to answer some of the questions than those answers given here. However, the final answer should still be the same.
3. Should you find any errors in the test during your moderation please do let us know via email: mathsatsharp@seartec.co.za so that we can correct it as soon as possible. We really appreciate your help towards making this a fantastic free resource for all maths teachers across South Africa.

Section 1 - Algebra

Question 1

1.1. $\sqrt[3]{13\,824}$ (2)

Prime Factorize = $\sqrt[3]{2^9 \times 3^3}$ √

Answer = $2^3 \times 3 = 8 \times 3 = 24$ √

1.2 868 = 2 x 2 x 7 x 31 (3)

948 = 2 x 2 x 31 x 3

512 = 2 x 2 x 31 x 2 x 2 x 2 √ (For prime factorizing)

HCF = 2 x 2 x 31 = 124 √

LCM = 4 x 7 x 31 x 3 x 2 x 2 x 2 = 20 832 √

1.3. 1.3.1. $\frac{-48+6}{-7} + (-3)(-4)(-2)$ (3)

$= \frac{-42}{-7} - 24$ √

$= 6 - 24$ √

$= -18$ √

1.3.2. $\sqrt{(-8)(-2)} + \sqrt[3]{(-8)(27)}$ (3)

$= \sqrt{16} + \sqrt[3]{-216}$ √

$= 4 - 6$ √

$= -2$ √

1.4. 1.4.1. 1 007 996 550 = 1.00799655 x 10^9 √ (1)

1.4.2. 6 302 520 = 6.30252 x 10^6 √ (1)

1.5. 1.5.2. 4.32 x 10^4 = 43 200 √ (1)

1.5.2. 9.0045 x 10^5 = 900 450 √ (1)

1.6. 1.6.1. $\frac{x^2y^3}{(x^2)^3} \div \frac{(x^3y^4)^0}{x^4y}$ (4)

$= \frac{x^2y^3}{x^6} \times \frac{x^4y}{1}$ √√√

$= \frac{x^6y^4}{x^6}$

$= y^4$ √

1.6.2. $\frac{\sqrt{x^4y^6}}{z^2} \times \frac{z^4y^3}{x^4}$ (2)

$= \frac{x^2y^3}{z^2} \times \frac{z^4y^3}{x^4}$ √

$= \frac{x^2y^6z^4}{x^4z^2}$

$= \frac{y^6z^2}{x^2}$ √

1.7. 1.7.1. The value of the position squared plus the value of the position. √√

OR $n^2 + n$ √√

OR add 2 more than was added to the previous number √√ (2)

1.7.2. 90 √√ (2)

[25]

Question 2

2.1. 2.1.1. 4 terms √ (1)

2.1.2. -12 √ (1)

2.1.3. $-\frac{3}{5}$ √ for negative √ for $\frac{3}{5}$ (2)

2.1.4. $4x^5 - \frac{3}{5}x^3 + 7x - 12$ if $x = -3$ (3)

$= 4(-3)^5 - \frac{3}{5}(-3)^3 + 7(-3) - 12$ √

$= 4(-243) - \frac{3}{5}(-27) - 21 - 12$

$= -972 + 16\frac{1}{5} - 33$ √

$= -988\frac{4}{5}$ √

2.2. 2.2.1. $2x(3x^2 - 4x + 7) - 3x(2x^2 + 8x - 9)$ (3)

$= 6x^3 - 8x^2 + 14x - 6x^2 - 24x^2 + 27x$ √√

$= -32x^2 + 41x$ √

2.2.2. $\frac{5x^4+15x^2-25x}{5x}$ (2)

$= \frac{5x^4}{5x} + \frac{15x^2}{5x} - \frac{25x}{5x}$

$= x^3 + 3x - 5$ √√

2.3. 2.3.1. $\frac{x}{8} + 9 = 2$ (2)

$\frac{x}{8} = -7$ √

$x = -56$ √

2.3.2. $\frac{3x}{5} - 7 = 5$ (3)

$\frac{3x}{5} = 12$ √

$3x = 60$ √

$x = 20$ √

2.4. $P = 2l + 2b$ (3)

$20 = 2(x) + 2(x - 2)$ √

$20 = 2x + 2x - 4$

$24 = 4x$

$x = 6$ √

The first side is 6cm and the second side is 4cm. √

[20]

Question 3

3.1. (6)

Fraction	Decimal	Percentage
$\frac{2}{3}$	$0.6\dot{6}$	$66\frac{2}{3}\%$
$\frac{13}{20}$	0.65	65%
$\frac{41}{50}$	0.82	82%

3.2. 3.2.1. Jamie = 12% = 0.12

Anita = 0.3 and Thando = $\frac{1}{4}$ = 0.25 √

∴ Anita does the most work. √ (2)

3.2.2. Work done = 12% + 30% + 25% √ (3)

= 67%

Still to be done = 100% - 67% √

= 33%

[11]

Question 4

4.1. (5)

x	1	2	3	4	6	8	12	16
y_1	36	32	28	24	16	8	-8	-24
y_2	36	18	12	9	6	$4\frac{1}{2}$	3	$2\frac{1}{4}$

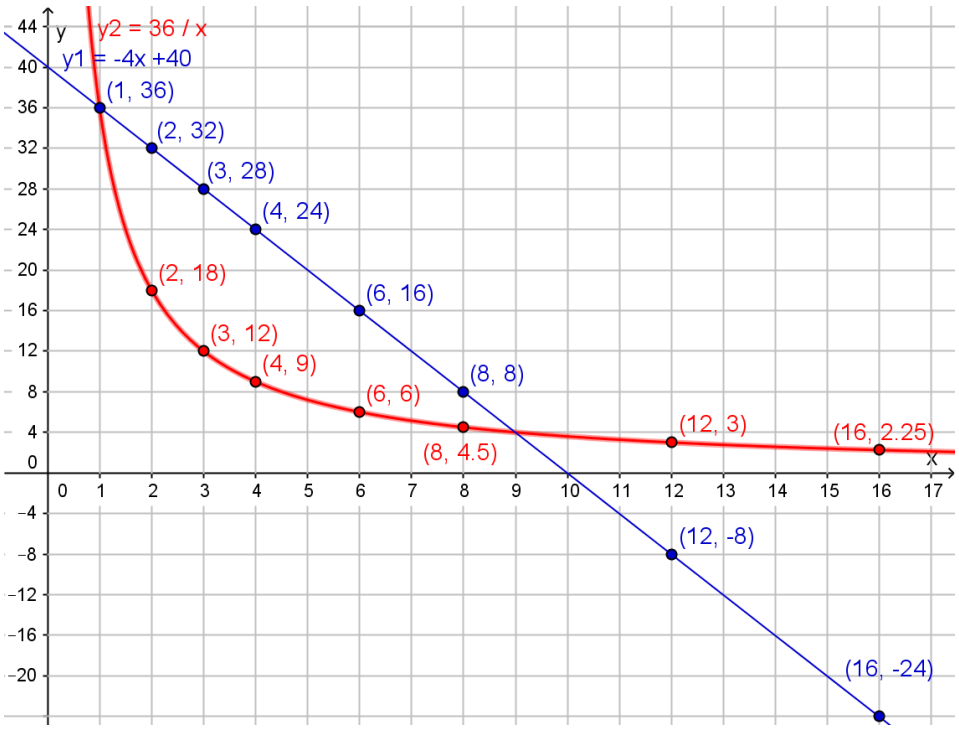
4.2. $y_1 = -4x + 40$ OR subtract 4 from the previous number √ (2)

$y_2 = 36 \div x$ OR 36 divided by the one number to get the second number. √

4.3. y_1 is decreasing √

y_2 is also decreasing. √ (2)

4.4.



Marks for graph:

Correct scales for x and y (not necessarily as has been done here) √

Correct plotting of coordinates for both graphs. √√

Correct lines for both graphs and labeling of graphs. √

4.5. Y2 is the correct graph √

Any valid reason; some suggestions include:

Y1 goes into the negative numbers which is impossible for the value of something to do. √

Y2, keeps decreasing but will not reach zero, which the value of something also does. √ (2)

[15]

Question 5

5.1. The chance of choosing a white marble is $\frac{4}{16}$ $or \frac{1}{4}$ √ (1)

5.2. The chance of choosing a green marble is 0 √ (1)

5.3. The chance of choosing a red or a blue marble is $\frac{4+4}{16} = \frac{8}{16}$ $or \frac{1}{2}$ √√ (2)

[4]

Section 2 – Geometry

Question 6

6.1. Construct the following without the use of a protractor.

6.1.1. These steps are taken from www.mathsisfun.com (4)

1. Place the compass at one end of line segment.
2. Adjust the compass to slightly longer than half the line segment length.
3. Draw arcs above and below the line.
4. Keeping the same compass width, draw arcs from other end of line.
5. Place ruler where the arcs cross, and draw the line segment.

Marks for:	Arcs above and below the line that intersect	√√
	Line segment drawn from the two intersecting arcs	√
	Perpendicular line marked and labelled	√

6.1.2. Steps: (5)

1. Draw a 4cm line. √
2. Draw an arc with a protractor that measures 4cm from one end of the line. √
3. Draw a second arc of the same size as the first √
4. Connect the ends of the first line to the intersection of the two arcs. √
5. Worked neatly and labelled points √

6.2. 6.2.1. B √ (5)

6.2.2. E √

6.2.3. A √

6.2.4. C √

6.2.5. D √

6.3. 6.3.1. Similar √

They have the same shape, but not the same size. √ (2)

6.3.2. Congruent √ (2)

They are the same shape (rhombus) and the same size (equal sides and angles) √

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Question 7

7.1. $D\hat{C}E = 90°$ √ Co-Interior angles, AB || CE. √ (2)

7.2. $B\hat{E}C = E\hat{C}F = 56°$ √ Corresponding angles, BE || AC √

$180° = A\hat{C}D + D\hat{C}E + E\hat{C}F$ √ Angles on a straight-line √

$\therefore A\hat{C}D = 180° - 90° - 56°$

$\therefore A\hat{C}D = 34°$ √ (5)

7.3. Congruent √

They have the same shape and size √ (2)

7.4. Trapezium, one set of sides are parallel. √√ (2)

[11]

Question 8

8.1. $PR^2 = PQ^2 + QR^2$ √

$PR^2 = (15)^2 + (8)^2$ √

$PR^2 = 225 + 64$

$\sqrt{PR^2} = \sqrt{289}$

$\therefore PR = 17cm$ √ (3)

8.2. DF is the longest side.

$\therefore DF^2 = \left(4\sqrt{13}\right)^2$ √

$\therefore DF^2 = 208$

And: $DE^2 + EF^2 = (8)^2 + (12)^2$ √

$DE^2 + EF^2 = 64 + 144 = 208$

$DF^2 = DE^2 + EF^2$ And ΔDEF is a right angles triangle proved through Pythagoras. √ (3)

8.3. 8.3.1. Circumference of semi-circle = $\frac{1}{2} \times 2\pi r$

$= \pi \times 10.5mm$

$= 32.99mm$ √

Base length of triangle $= \sqrt{13^2 - 10^2}$

$= \sqrt{169 - 100}$

$= \sqrt{69}$

$= 8.31\ mm$ √

Length of rectangle = 2 x 10.5mm

= 21mm √

∴ Perimeter of shape = Circumference of semi-circle + 10mm + base of rectangle + base of triangle + 13mm

= 32.99mm + 10mm + 21mm + 8.31mm + 13mm

= 85.3mm √ (4)

8.3.2. Area of semi-circle = $\frac{1}{2} \times \pi r^2$

$= \frac{1}{2} \times \pi\ (10.5)^2$

$= 173.18mm^2$ √

Area of rectangle = $l \times b$

$= 10mm \times 21mm$

$= 210mm^2$ ½ mark

Area of triangle = $\frac{1}{2}\ b\ \times\perp\ h$

$= \frac{1}{2} \times 8.31mm\ \times 10$

$= 41.55mm^2$ ½ mark

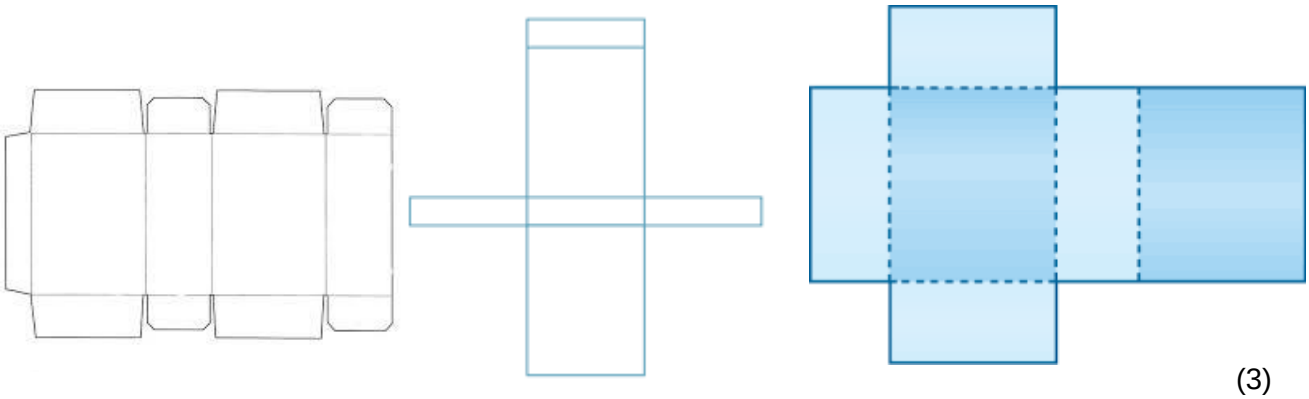
Total Area = Area of semi-circle + area of rectangle + area of triangle

$= 173.18mm^2 + 210mm^2 + 41.55mm^2$

$= 424.73mm^2$ √ (3)

8.4. 8.4.1.1. The net needs to have three sets of identical rectangles, with measurements Indicated √

The net can be any of the following √√



(3)

8.4.1.2. Surface Area = $2(lb + lh + bh)$

$= 2(31cm\ \times 20cm + 31cm\ \times 8cm +\ 20cm\ \times 8cm)$

√√ (1 for correct substitution and 1 for converting 80mm to 8cm).

$= 2(620cm^2 + 248cm^2 + 160cm^2)$

$=\ 2\ 056cm^2$ √ (3)

8.4.2. Volume $= l\ \times b \times h$

$= (31cm - 4cm) \times 20cm\ \times 8cm$

√√ one for substituting and correct formula and one for subtracting 4 from 31.

$= 27cm\ \times 160cm^2$

$= 4\ 320cm^2$ √ (3)

8.5. Give the names of the following 3D-shapes.

8.5.1.	Hexagonal prism.	√	(1)	8.5.2.	Dodecahedron	√	(1)
8.5.3.	Icosahedron	√	(1)	8.5.4.	Octahedron	√	(1)
8.5.5.	Square-based pyramid	√	(1)				

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Question 9

9.1.	A → A' = translated one unit up and 3 units right	√	(5)
	B → B' = reflected about the x-axis	√	
	C → C' = reflected about the y-axis	√	
	DEF → D'E'F' = Enlarged by a factor of $\frac{3}{2}$ or $1\frac{1}{2}$	√√	

9.2.	9.2.1. G (-7; 3) → G' (-7; -3)	√	(1)
	9.2.2. H (2; -3) → H' $\left(\frac{2}{3}; -1\right)$	√	(1)

[7]

Question 10

10.1.	0	0, 4, 9		
	1	3, 7, 8, 9, 9		
	2			
	3	4, 6		
	4		√ Mark for correct order.	
	5	1	√ Mark for stem (i.e. 0 – 5)	(2)

10.2. 10.2.1. Mean = $\frac{0+4+9+13+17+18+19+19+34+36+51}{11}$ √

$= \frac{220}{11}$

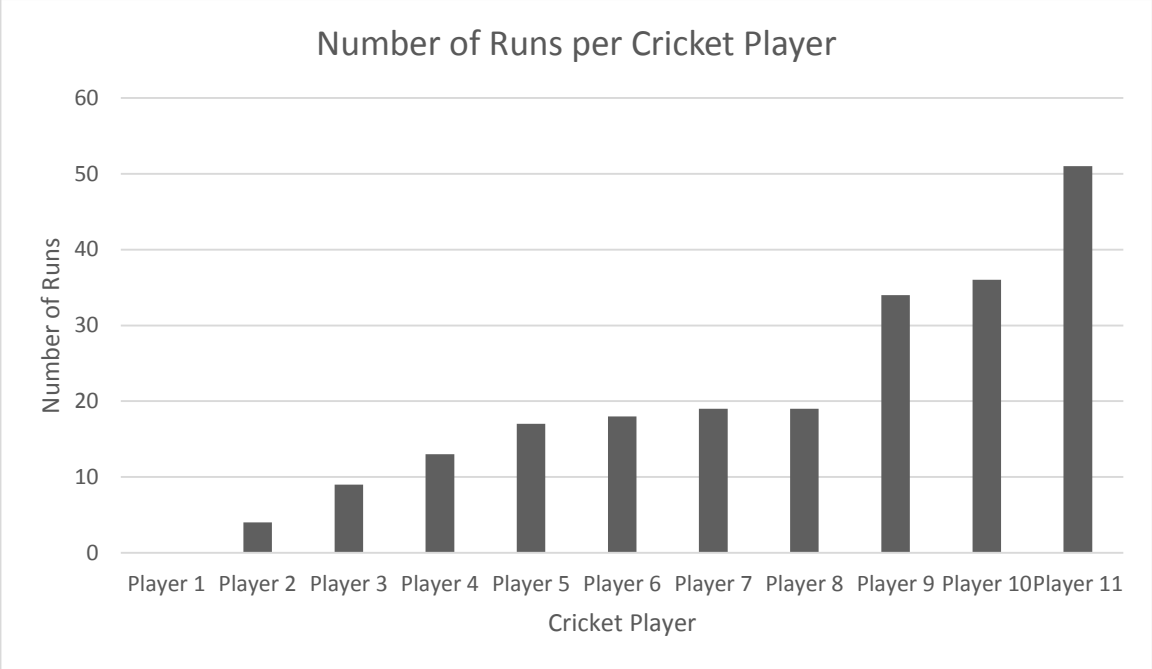
$= 20$ √ (2)

10.2.2. Mode = 19 √ (1)

10.2.3. Median = 18 √ (1)

10.2.4. Range = 51 – 0 = 51 √ (1)

10.3.



Marks for: correct labels √

Leaving spaces between bars √

And correctly drawing bars √ (3)

10.4. The average would be increased by five runs √

Because, 5 runs per player times 11 gives 55 extra runs with an average of 5 extra runs, which would be added to the average. √ (2)

[12]

Grand Total [150]