Barker College

Student Name: _____

Teacher Initials: _____

ESP (Mrs Pratt)
ARP (Mr Perkins)
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Monday, 17th August 2020
Period 1 or 4
55 minutes
175 copies

Year 9
5.3 MATHEMATICS
Assessment Task #3

General Instructions

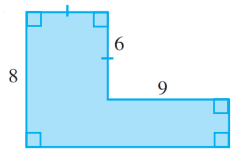
- Write your name in the spaces provided
- Write using blue or black pen
- Answer in the spaces provided
- NESA approved calculators may be used
- Show ALL necessary working
- Diagrams are NOT to scale
- Marks may not be awarded for careless or poorly arranged working
- A formula sheet at the end of the paper may be detached

Section	Marks
1. Surface Area and Volume	/ 16
2. Equations and Inequalities	/ 29
3. Coordinate Geometry	/ 12
4. Mixed Questions	/ 14
Total Marks:	**/ 71**

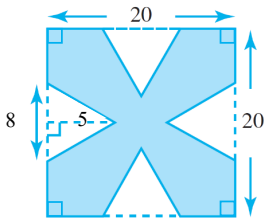
Part 1: Surface Area and Volume (16 marks)

1. Find the area of the following composite figures. All units are in cm.

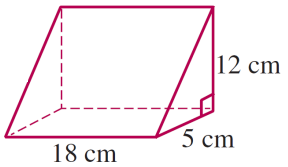
a. **2**



b. Note: all four triangles are the same size. **3**



2. Find the surface area of the following solid. **3**

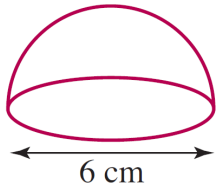


3. Harold has a drink bottle that is in the shape of a cylinder.
It has a radius of 5 cm and a height of 15 cm.

i. What is the volume of his drink bottle? Round your answer to 1 dp. **2**

ii. What is its capacity in litres? **1**

4. What is the **exact** surface area of this closed hemisphere? **2**



5. The volume of a cone is 1200 cm^3. If its height is 12 cm, what is the radius of its base? **3**
Round your answer to 1 dp.

Part 2: Equations and Inequalities (29 marks)

1. Solve the following equations.

a. $6x-8=58$ **2**

b. $2(2x+3)=17$ **2**

c. $\frac{2}{3}(6-5m)=12$ **2**

d. $\frac{m+5}{3}=\frac{2m+3}{4}$ **3**

e. $\frac{6h}{7}-\frac{h}{3}=8$ **3**

2. Write an inequality that represents the diagram below. **1**

3. Four less than twice a number is multiplied by eight and the result is 16.
Write an equation for this statement then solve it to find the number. **3**

4. Consider the equation for escape velocity from Earth: $V = \sqrt{2gR}$.

i. Make R the subject of the equation. **2**

ii. Find the value of R if $V = 10$ and $g = 9.8$. Round to 1 decimal place. **1**

5. Solve the following inequality and plot your solution on a number line. **3**

$$2(5-b) > -22$$

6. Rearrange the following equation so that a is the subject. **3**

$$ay = tx - at^2$$

7. Mike is four times as old as Ron.

i. Write expressions for their ages now. **1**

ii. Write expressions for their ages in 5 years time. **1**

iii. In 5 years time, Mike will be three times as old as Ron.
Use your answers to parts i. and ii. to write an equation and find the present ages of Mike and Ron. **2**

Part 3: Coordinate Geometry (12 marks)

1. Does the point (2, 3) lie on the line $y = 10 - 3x$? **2**
Justify your answer with mathematical working.

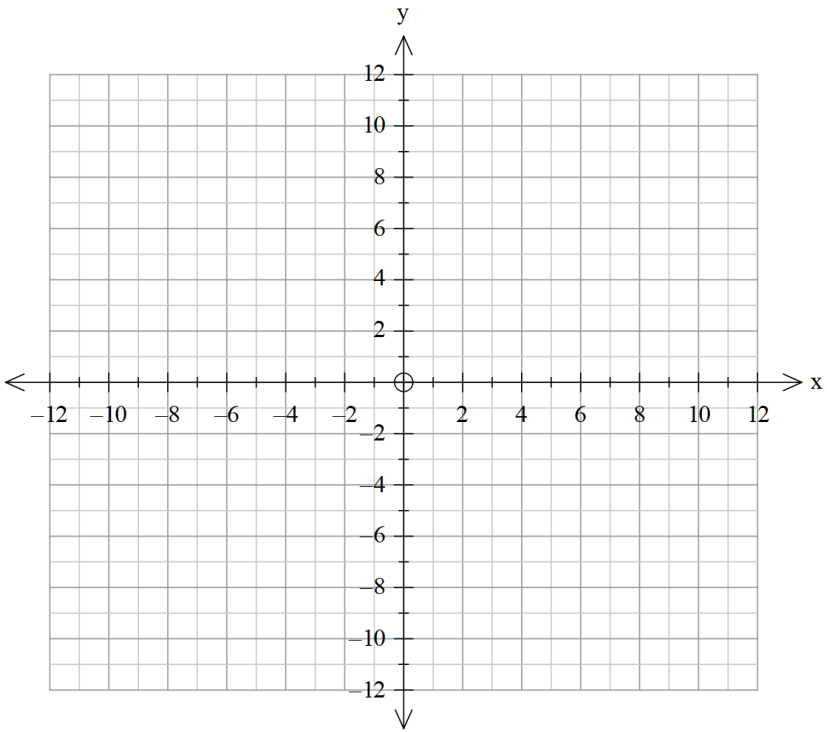
2. What is the equation of the horizontal line that passes through (1, 4)? **1**

3. Find the distance between the points (2, 5) and (8, -3). **2**

4. Find the midpoint of the interval joining (4, 7) and (-8, 11). **2**

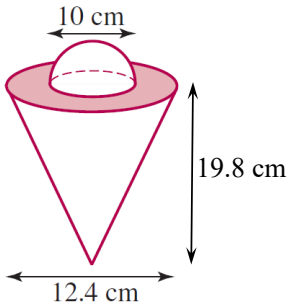
5. Find the gradient of the line that passes through the points (-6, 2) and (-12, 5). **2**

6. Using any method, graph the line $3x + 2y = 12$ on the axes below. **3**



Part 4: Mixed Questions (14 marks)

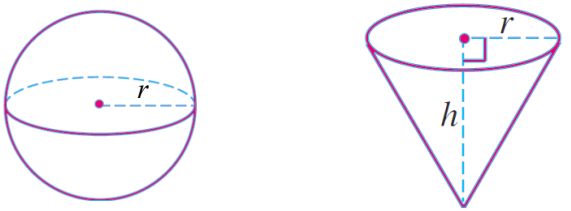
1. Calculate the surface area of the following solid. Answer to the nearest whole number. **4**



2. Solve the inequality $\frac{3t}{8} - \frac{2t}{5} < \frac{t}{4} + 44$ **4**

3. The point (8, 3) is the midpoint of the interval joining (9, y) and (x, 7). **2**
Find the values of x and y, showing working.

4. A sphere and a cone both have the same radius, r cm.



i. If they both have the same volume, V cm^3, what is the height of the cone? **2**
Leave your answer in terms of r.

Question 4 is continued on the next page.

ii. The sphere and the cone are melted down and joined to form a square pyramid with a height of πr cm.

Show that the diagonal of the square has the same length as the height of the original cone. **2**

End of Assessment

Formula Sheet

Coordinate Geometry

Gradient of a line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance between two points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint of an interval joining two points

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Area

Circle

$$A = \pi r^2$$

Sector

$$A = \frac{\theta}{360} \pi r^2$$

Annulus

$$A = \pi \left(R^2 - r^2 \right)$$

Trapezium

$$A = \frac{h}{2}(a + b)$$

Surface Area

Sphere

$$A = 4\pi r^2$$

Closed cylinder

$$A = 2\pi r^2 + 2\pi rh$$

Cone

$$A = \pi r^2 + \pi rl$$

Volume

Prism or cylinder

$$V = Ah$$

Pyramid or cone

$$V = \frac{1}{3} Ah$$

Sphere

$$V = \frac{4}{3} \pi r^3$$

Volume and Capacity

Unit conversion: 1 m^3 = 1000 L

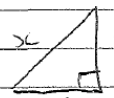
Year 9 5-3 Assessment #3
Student Solutions

Part 1

1(a) $(8\times6)+(9\times2)$
$=66cm^2$

(b) Area Square: 20×20
$=400$
Area 4 Δs $=4(\frac{1}{2}\times8\times5)$
$=80$
Total: $400-80$
$=320cm^2$

2.



$x^2=12^2+5^2$
$x=13$

$\therefore A.=(18\times13)+(18\times5)+(18\times12)+2(\frac{1}{2}\times5\times12)$
$=234+90+216+60$
$=600cm^2$

3.(i) $V=\pi\times5^2\times15$
$=1178.1cm^3$

(ii) $1178.1\div1000$
$=1.1781L$

4. $SA=3\times\pi\times3^2$
$=27\pi\ cm^2$

5. $\frac{1}{3}\pi R^2\times12=1200$
$\pi R^2=300$
$R^2=\frac{300}{\pi}$
$R=\sqrt{300/\pi}$
$R=9.8cm$

Part 2

1(a) $6x-8=58$
$6x=66$
$x=11$

(b) $2(2x+3)=17$
$4x+6=17$
$4x=11$
$x=11/4$

(c) $\frac{2}{3}(6-5m)=12$
$4-\frac{10m}{3}=12$
$-\frac{10}{3}m=8$
$-10m=24$
$m=-2.4$

(d) $4(m+5)=3(2m+3)$
$4m+20=6m+9$
$20=2m+9$
$11=2m$
$m=\frac{11}{2}$

(e) $21\left(\frac{6h}{7}\right)-21\left(\frac{h}{3}\right)=8\times21$
$18h-7h=168$
$11h=168$
$h=\frac{168}{11}$ or 15.27

2. $x\leq-2$

3. $8(2x-4)=16$
$2x-4=2$
$2x=6$
$x=3$

4.(i) $V^2=2gR$
$\frac{V^2}{2g}=R$

(ii) $R=\frac{10^2}{2\times9.8}$
$R=5.1$

5. $5-b>-11$
$-b>-16$
$b<16$

6. $ay+at^2=tx$
$a(y+t^2)=tx$
$a=\frac{tx}{y+t^2}$

7.(i) Mike $=4x$ Ron $=x$

(ii) Mike $=4x+5$
Ron $=x+5$

(iii) $3(x+5)=4x+5$
$3x+15=4x+5$
$15=x+5$
$x=10$
Ron: 10 Mike: 40

Part 3:

1. $3=10-3(2)$
$3=10-6$
$3\neq4$
$(2,3)$ does not lie on line

2. $y=4$

3. $d=\sqrt{(8-2)^2+(-3-5)^2}$
$d=\sqrt{36+64}$
$d=10$

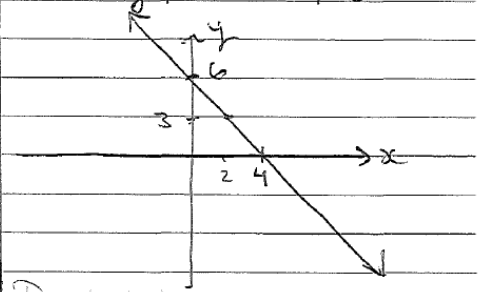
4. $M=\left(\frac{4+-8}{2},\frac{7+11}{2}\right)$
$(-2,9)$

5. $m=\frac{5-2}{-12+6}$
$m=\frac{3}{-6}$
$m=-1/2$

6. x-int: $y=0$
$3x=12$
$x=4$
y-int: $x=0$
$2y=12$
$y=6$

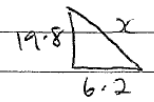
OR

x	-2	0	2
y	9	6	3



Part 4:

1. Curved SA:



$x^2=6.2^2+19.8^2$
$x=20.748$

$=\pi\times6.2\times20.748$
$=404.1269....$

Hemisphere $= 2\pi(5)^2$

$= 157.0796...$

Annulus $= \pi(6.2)^2 - \pi(5)^2$

$= 42.223...$

Total $= 404.1269 + 157.079 + 42.223$

$= 603 cm^2$

2. $\frac{3t}{8} - \frac{2t}{5} < \frac{t}{4} + 44$

$40\left(\frac{3t}{8}\right) - 40\left(\frac{2t}{5}\right) < 40\left(\frac{t}{4}\right) + 44 \times 40$

$15t - 16t < 10t + 1760$

$-t < 10t + 1760$

$-11t < 1760$

$t > -160$

3. $\frac{9+x}{2} = 8$

$9 + x = 16$

$x = 7$

$\frac{y+7}{2} = 3$

$y + 7 = 6$

$y = -1$

4. (i) $\frac{4}{3}\pi R^3 = \frac{1}{3}\pi R^2 h$

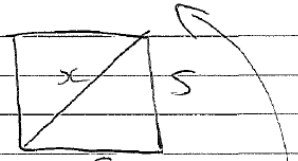
$4R = h$

(ii) Vol Pyramid $= \frac{1}{3}s^2 \times \pi R$

Vol sphere + Cone $= \frac{2}{3}\pi R^2 h$

$\therefore \frac{1}{3}s^2 \times \pi R = \frac{2}{3}\pi R^2 h$

$s^2 = 2Rh$



$x^2 = s^2 + s^2$

$x^2 = 2s^2$

But $s^2 = 2Rh$

$x^2 = 2(2Rh)$

$x^2 = 4Rh$

from (i) $h = 4r$

$x^2 = 4r(4r)$

$x^2 = 16r^2$

$x = 4r$

$\therefore$ Same as h of cone

END