YEAR 10
MATHEMATICS
Stage 5.3

ASSESSMENT TASK 3
2011

CALCULATOR ALLOWED

STUDENT NAME: _____   **MARK**   / 80

TEACHER: _____


TIME ALLOWED: 45 minutes

WEIGHTING: 20 %

Directions:
- Answer all the questions in the space provided.
- Show all necessary working. Where more than one mark is allocated to a question, full marks may not be awarded for answers only.
- Marks may not be awarded for careless or badly arranged work.
- Calculators may be used

Question 3

For the following line find

a)   the y - intercept

b)   the gradient

c)   the equation of the line
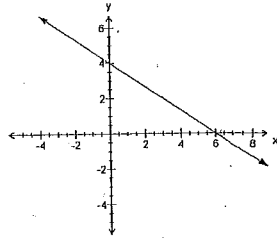
Question 4

For the points A $(-3, 2)$ and B $(2, 5)$ find

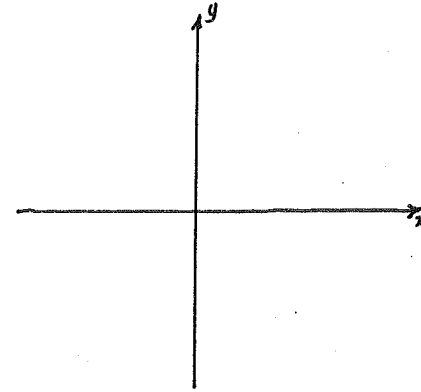a)   the exact distance between A and B   2

b)   the gradient of the line joining A and B   2

c)   the midpoint of the line AB   2

d)   the equation of the line AB in general form   3

Question 1

On the same number plane, draw the graphs of the following lines. (Label each line)   4

a) $y = 2x + 1$
b) $x + 2y = 6$

Question 2

For the line $2x - y = 6$ find   3

a)   the y - intercept

b)   the x - intercept

c)   the gradient

Question 7

Write the equation of the circle which has a radius of 3 units and has the centre at the origin.

2

Question 8

For the parabola $y = x^2 - 6x + 8$ find

a)   the y – intercept

1

b)   the x – intercepts

2

c)   the axis of symmetry

1

d)   the co-ordinates of the vertex

1

e)   Sketch the curve showing all relevant features

3

Question 5

For the following equations write whether the graphs are straight lines, parabolas, hyperbolas, circles, exponentials or cubic functions.

a) $y = \dfrac{2}{x}$ _____

b) $3x - y = 0$ _____

c) $y = -7$ _____

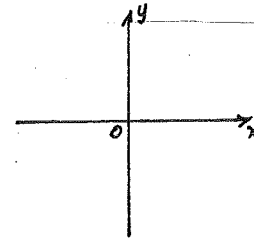d) $y = \dfrac{1}{2}x^2 + 3$ _____

e) $y = x^3$ _____

f) $y = 2^x$ _____
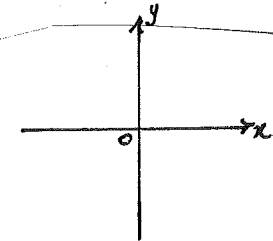

Question 6

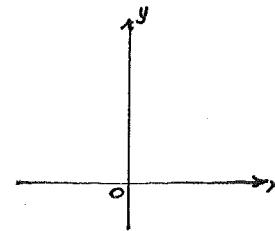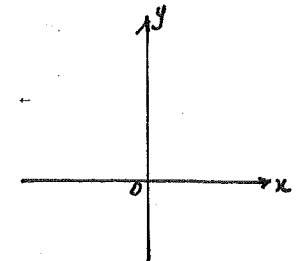Sketch the following

a) $y = -x^3$
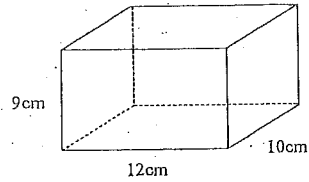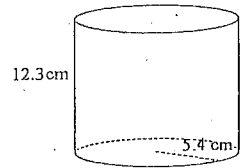

b) $x^2 + y^2 = 4$

c) $y = x^2 + 2$

d) $y = 2^x$

Question 10

Find the surface area of the following

a)

3
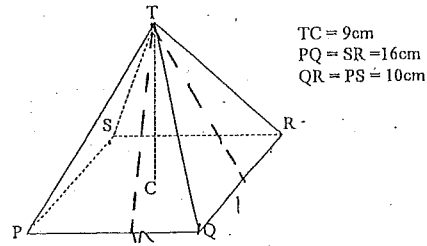
9cm
10cm
12cm

b)
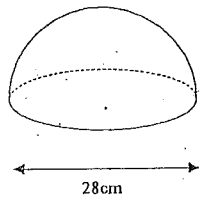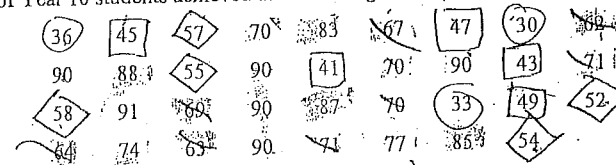
3

12.3cm
5.4cm

c)

4

TC = 9cm
PQ = SR = 16cm
QR = PS = 10cm

T
S
R
C
P
Q

d)

3

28cm

Question 9

A group of Year 10 students achieved the following scores in a Maths test.

36 45 57 70 83 67 47 30 62
90 88 55 90 41 70 90 43 71
58 91 69 90 87 70 33 49 52
64 74 63 90 71 77 85 54

4

a) Draw a stem and leaf plot to show this information

b) Find the

i) mode _____

ii) mean _____

iii) median _____

iv) range _____

v) interquartile range _____

vi) standard deviation _____

c) Describe the shape of the data.

d) Jerry scored 34 in this Maths exam and scored 35 in his History exam, which had an average of 50 and a standard deviation of 10. Which exam did he perform better in? Justify your answer.

3

Question 12

a) Approximately how many spherical balls of diameter 0.5cm could be made from a melted down cube of side length 5cm?
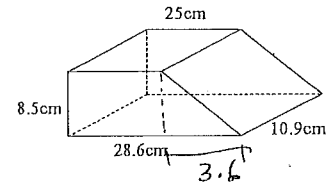
3

b) The volume of a sphere is 398m³. Find the diameter of the sphere correct to 3 significant figures.
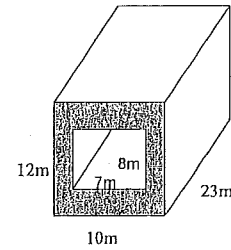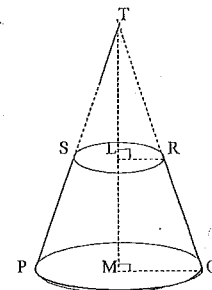
3

Question 11

Find the volume of the following

a)

25cm
8.5cm
28.6cm
3.6
10.9cm

2

b)

12m
8m
7m
10m
23m

3

c)

TL = 8cm
LM = 10cm
LR = 4cm
MQ = 9cm

T
S   L   R
P   M   Q

3

J.M.J Ch
MARCELLIN COLLEGE RANDWICK

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Question 3

For the following line find

$(6,4)$

$(6,0)$

$\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{4-0}{0-6}$

$= \dfrac{4}{-6} = \left(-\dfrac{2}{3}\right)$

a) the y - intercept

4. ✓

b) the gradient

$-\dfrac{2}{3}$ ✓

$-\dfrac{4}{6}$ $\dfrac{2}{?}$

$\dfrac{0-4}{6-0} = -\dfrac{4}{6} = -\dfrac{2}{3}$

c) the equation of the line

$y = \dfrac{2}{3}x + 4$ ✓

Question 4

$\dfrac{x_1 y_1}{}$ $\dfrac{x_2 y_2}{}$

For the points A (-3, 2) and B (2, 5) find

a) the exact distance between A and B   **2**

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

$(2+3)^2 + (5-2)^2$ $d = \sqrt{34}$ ✓   **2**

$\sqrt{25 + 9}$

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

b) the gradient of the line joining A and B   **2**

$\dfrac{y_2 - y_1}{x_2 - x_1}$ $\dfrac{5-2}{2+3} = \dfrac{3}{5}$ ✓   **2**

c) the midpoint of the line AB   **2**

$\dfrac{x_2 + x_1}{2}$ $\dfrac{y_2 + y_1}{2}$ $\dfrac{-3+2}{2}$ $\dfrac{2+5}{2}$

$-\dfrac{1}{2}$, $3\dfrac{1}{2}$ ✓   **2**

d) the equation of the line AB in general form   **3**

$y - y_1 = m(x - x_1)$

$y - 5 = \dfrac{3}{5}(x - 2)$

$5y - 25 = 3x - 6$

$5y = 3x - 6 + 25$ ✓

$0 = 3x - 5y + 19$ ... mmm

5

14

Marks

Question 1

On the same number plane, draw the graphs of the following lines. (Label each line)   **4**

a) $y = 2x + 1$

b) $x + 2y = 6$

$2y = 6 - x$
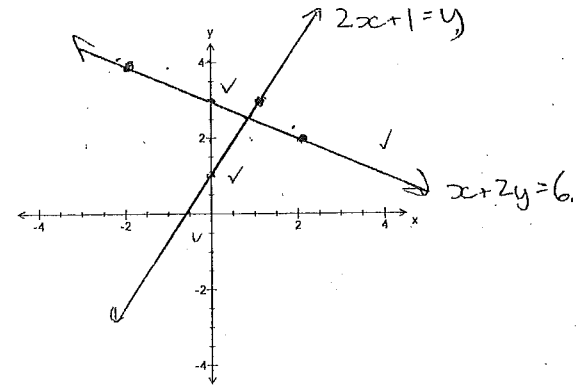
$y = 3 - \dfrac{1}{2}x$

$2y = 6 - x$

$y = 3 - \dfrac{1}{2}x$

$y = 2x + 1$

$2x + 1 = y$

$x + 2y = 6$

4

Question 2

For the line $2x - y = 6$ find   **3**

a) the y - intercept

$2(0) - y = 6$ $y = -6$ ✓

$-y = 6$

$2(0) - y = 6$

$0 - y = 6$

$y = -6$

b) the x - intercept

$2x = 6$

$x = 3$ ✓

$2x - 0 = 6$

$2x = 6$

$x = 3$

c) the gradient

$2x - 6$

$2x - 6 = y$ ✓

$m = 2$

$2x - y = 6$

$2x - 6 = y$

7

Question 7

Write the equation of the circle which has a radius of 3 units and has the centre at the origin.

2

$$x^2 + y^2 = 9$$

Question 8

For the parabola $y = x^2 - 6x + 8$ find

a) the y – intercept

1

$$y = 0 - 0 + 8$$
$$y = 8$$

b) the x – intercepts

2

$$x \quad -2 \quad (x-2)(x-4)$$
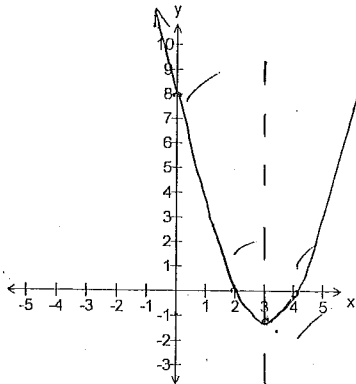$$x \quad -4$$
$$x = 2 \text{ or } 4.$$

c) the axis of symmetry

1

$$\frac{-b}{2a} \quad \frac{+6}{2} = 3$$

d) the co-ordinates of the vertex

1

$$3^2 - 6(3) + 8 = -1 \quad (3, -1)$$

e) Sketch the curve showing all relevant features

3

Question 5

For the following equations write whether the graphs are straight lines, parabolas, hyperbolas, circles, exponentials or cubic functions.

$$3x = y$$
$$3 = \frac{y}{x}$$

a) $y = \dfrac{2}{x}$ _hyperbolas_

hyperbolas

b) $3x - y = 0$ straight line _straight line._

c) $y = -7$ _straight line_

d) $y = \dfrac{1}{2}x^2 + 3$ _parabola_

e) $y = x^3$ _cubic function_

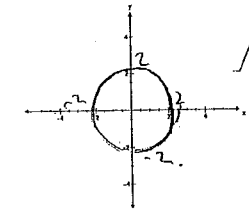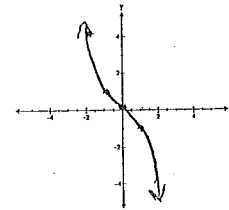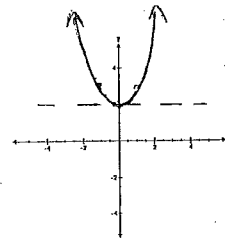f) $y = 2^x$ _exponentials_

6

Question 6

4

Sketch the following

a) $y = -x^3$

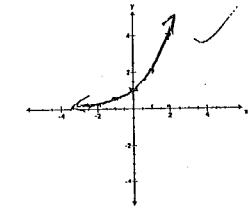$x^2 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2$

b) $x^2 + y^2 = 4$

c) $y = x^2 + 2$

d) $y = 2^x$

Question 10

Find the surface area of the following

a)

9cm
12cm
10cm

$(9 \times 12 \times 2) + (9+12+9+12) 10$ **3**

$216 + 420$

$= 636 \, cm^2$ ✓

---

b)

12.3cm
5.4 cm
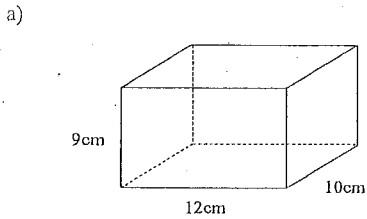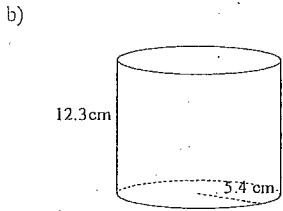
$2\pi r^2 + 2\pi r h$ **3**

$2\pi \, 5.4^2 + 2\pi \, 5.4 \times 12.3$

$58.32\pi + 132.84\pi$

$= 191.16\pi = 600.55 \, (2\,dec)$
cm^2

---

c)

T
S
R
C
P
Q

TC = 9cm
PQ = SR = 16cm
QR = PS = 10cm

4

$(16 \times 10) + (16 \times \sqrt{106}) + (10 \times \sqrt{145})$

$160 +$

$= 445.15 \, cm^2$
$(2\,dec)$

$10 \, \sqrt{145}$
$16 \, \sqrt{106}$

$9 \, \sqrt{145} \quad 9 \, \sqrt{106}$
$8 \qquad 5$

$9 \quad \triangle$
16

---

d)

28cm

3
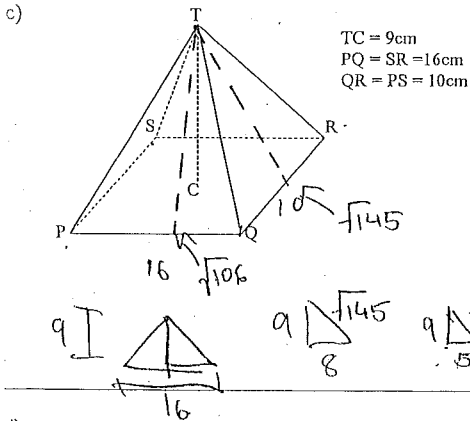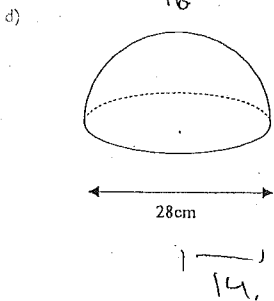
$\dfrac{4\pi r^2}{2} + \pi r^2$

$\dfrac{4\pi \, 14^2}{2} + \pi \, 14^2$

$392\pi + 196\pi$

$588\pi = 1847.3 \, cm^2$ ✓✗
$(1\,dec)$

$14.$

13

Question 9

A group of Year 10 students achieved the following scores in a Maths test.

36 45 57 70 83 67 47 30 ──
90 88 55 90 41 70 90 43 71
58 91 ── 90 87 70 33 49 52
64 74 63 90 ── 77 85 54

52
54
55
57
58

a) Draw a stem and leaf plot to show this information **4**

stem	leaf
3	0 3 6
4	1 3 5 7 9
5	2 4 5 7 8
6	2 3 4 7 9
7	0 0 0 1 4 4 7
8	3 5 7 8
9	0 0 0 0 0 1

4 ✓

85 − 52

b) Find the

i) mode _____ 90 ✓ **6**

ii) mean _____ 66.9 66.19.2 66.2 65.7

iii) median _____ 69 ✓

iv) range _____ 61

v) interquartile range _____ 33 ✓

vi) standard deviation _____ 18.7 16.2 18.2 20.2

4

c) Describe the shape of the data. **1**

Negatively skewed ✓

1

d) Jerry scored 34 in this Maths exam and scored 35 in his History exam, which had an average of 50 and a standard deviation of 10. Which exam did he perform better in? Justify your answer. **3**

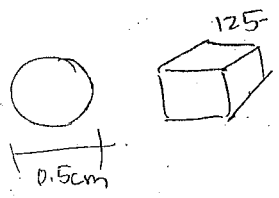Math $\dfrac{34 - 66.9}{18.2} = -1.8$ ⠀⠀ His. $\dfrac{35 - 50}{10} = -1.5$

3

History becaus it is closer to

/12

Question 12

a) Approximately how many spherical balls of diameter 0.5cm could be made from a melted down cube of side length 5cm?   **3**

125

$5 \times 5 \times 5 = 125$ $5^3 = 125$ **2**

$\frac{4}{3}\pi 0.25^2$

$\frac{4}{3}\pi r^3 = \frac{4}{3}\pi 0.25^3 = 0.021\pi$

$\boxed{894.7}$ balls ✗

b) The volume of a sphere is 398m³. Find the diameter of the sphere correct to 3 significant figures.   **3**

$\frac{4}{3}\pi r^3 = 398$

$4\pi r^3 = 1194$

$r^3 = \frac{1194}{4\pi}$

$r^3 = \frac{298.5}{\pi}$

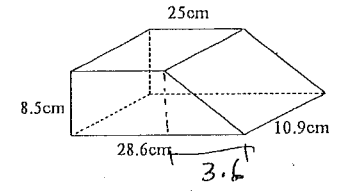$r = \sqrt[3]{\frac{298.5}{\pi}}$

$r = 4.56 =$

$2r = d$

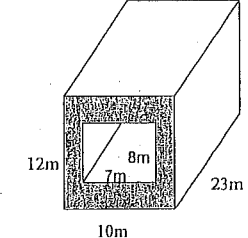$2(4.56) = d$

$d = 9.13 \ (2\ dec)$

3
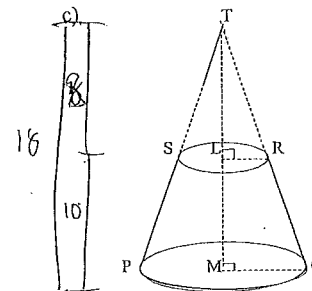
/5

Question 11

Find the volume of the following

a)

25cm
8.5cm
28.6cm
10.9cm
3.6

$25 \times 8.5 \times 10.9 = 2316.25$ **2**

$\frac{3.6 \times 8.5 \times 10.9}{2} = 166.77$

$= 2483.02 cm^3$ ✓ **2**

b)

12m 8m 7m 23m 10m

3

$(12 \times 10 \times 23) - (7 \times 8 \times 23)$

$2760 - 1288 =$ **3**

$= 1472\ m^3$ ✓

c)

TL = 8cm
LM = 10cm
LR = 4cm
MQ = 9cm

18 10

$\frac{1}{3}\pi r^2 h - \frac{1}{3}\pi r^2 h$ **3**

$\frac{1}{3}\pi 9^2 18 - \frac{1}{3}\pi 4^2 8$

$= 486\pi - 42\frac{2}{3}\pi$ **3**

$= 443\frac{1}{3}$

$= 1392.7\ cm^3 (2\ dec)$

/8