Carlingford High School

Mathematics

Year 10 Term 2 Examination

5.3 Course

2018

Name: SOLUTIONS Class: _____

Circle your teacher's name: Mrs Lobejko Mrs Lego Ms Aung

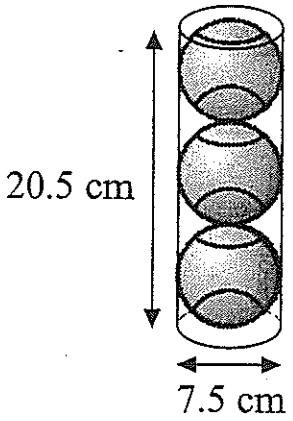
Time allowed: 50 minutes

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Complete the examination in blue or black pen.

	SURFACE AREA & VOLUME	DATA ANALYSIS	Total
	/22	/30	/52
Extension*	/3	/2	/5
Total	/25	/32	/57

SURFACE AREA and VOLUME (25 marks)

1. Tennis balls can be purchased in a cylindrical tin containing three balls. Find the **volume**, correct to 4 significant figures of the :



(a) cylindrical tin [2]

$V = \pi r^2 \times h$
$= \pi(3.75)^2 \times 20.5$
$= 905.662...$
$\doteq 905.7 \text{ cm}^3$

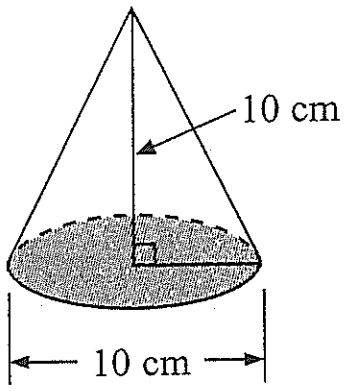
(b) 3 tennis balls [2]

$V = 3 \times \frac{4}{3}\pi r^3$
$= 4 \times \pi \times (3.75)^3$
$= 662.679...$
$\doteq 662.7 \text{ cm}^3$

(c) air surrounding the tennis balls. [1]

$V = 905.662.. - 662.679...$
$= 242.98..$
$= 242.0 \text{ cm}^3$

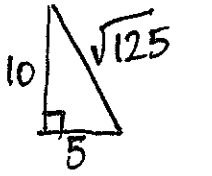
2. Given the cone below, calculate in exact form:



(a) Volume [2]

$V = \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi(5)^2 \times 10$
$= \frac{250\pi}{3} \text{ cm}^3$

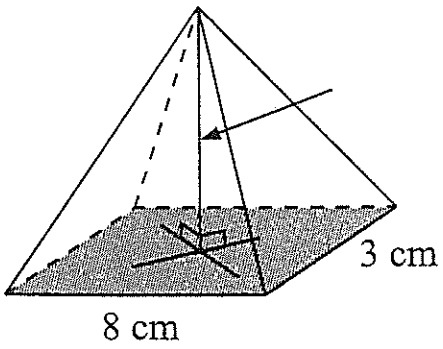
(b) Surface area. [3]



$\sqrt{125} = 5\sqrt{5}$

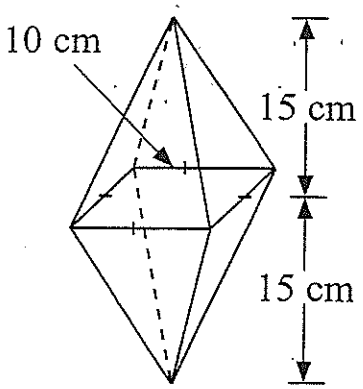
$SA = \pi r^2 + \pi r s$
$= \pi(5)^2 + \pi(5)(5\sqrt{5})$
$= 25\pi + 25\sqrt{5}\pi$
$= 25\pi(1+\sqrt{5})$

3. Given the volume of a rectangular pyramid is $48.5cm^3$, find the altitude of the pyramid, correct to 2 decimal places. [2]



$V = \frac{1}{3} \times A \times h$
$48.5 = \frac{1}{3}(8 \times 3) \times h$
$\therefore h = \frac{48.5}{8}$
$= 6.062...$
$\doteq 6.06 \text{ cm}$

4. Given the composite shape below find the:



(a) Volume (1dp) [2]

$V = \frac{1}{3}Ah \times 2$

$= \frac{1}{3} \times 10^2 \times 15 \times 2$

$= 1000\ cm^3$

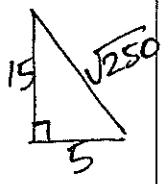
(b) Surface area (1dp) [3]

$SA = 8 \times \frac{1}{2}bh$

$= 8 \times \frac{1}{2} \times 10 \times \sqrt{250}$

$= 632.455...$

$= 632.5\ cm^2$



5. Two similar triangles have their area in the ratio 4: 9 . If the length of the base of the smaller triangle is $5cm$, find the length of the base of the larger triangle. [2]

Area 4 : 9

Sides 2 : 3

$\frac{x}{5} = \frac{3}{2}$

$2x = 15$

$x = 7.5\ cm$

6. A bottle is $12cm$ high and contains $450ml$ of liquid . A similar bottle is $18cm$ high. How much liquid does it contain? (to the nearest ml) [3]

height 12 : 18

= 2 : 3

Volume $2^3 : 3^3$

$\frac{x}{450} = \frac{3^3}{2^3}$

$x = 1518.75$

$= 1519\ mL$

✱ 7. If a cylinder with diameter $2r$ and height $2r$ has the same surface area as a sphere of radius R, show $R = \sqrt{\frac{3}{2}}r$. [3]

SA of cylinder $= 2\pi r^2 + 2\pi rh$

SA of sphere $= 4\pi r^2$

$4\pi R^2 = 2\pi(r)^2 + 2\pi(r)(2r)$

$4\pi R^2 = 2\pi r^2 + 4\pi r^2$

$4\pi R^2 = 6\pi r^2$

$R^2 = \frac{6\pi r^2}{4\pi}$

$R^2 = \frac{3}{2}r^2$

$\therefore R = \sqrt{\frac{3}{2}}r$

DATA ANAYSIS (32 marks)

1. Describe the shape of the distribution below: [2]

Stem	Leaf
2	2 7
3	0 2 5 6 8
4	4 6 7 7 8 9
5	0 2 2 8 9
6	4 5 5
7	6 6
8	2 7
9	0

Positive skew

2. Write a five point summary and draw a box and whisker plot for the following data. [4]

7 8 5 6 14 10 4 4 4 9 8 15 13

4 4 4 5 6 7 8 8 9 10 13 14 15

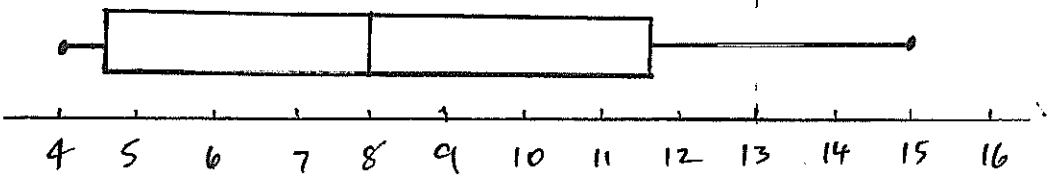
Lowest = 4

Q_1 = 4.5

Median = 8

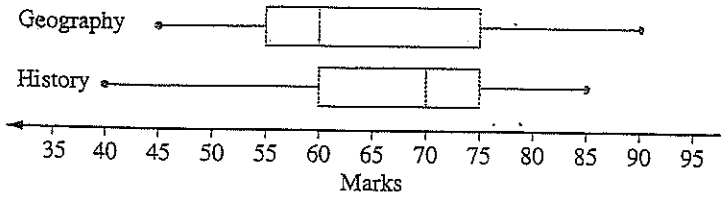
Q_3 = 11.5

Highest = 15



3. Consider the parallel box plots which display the marks of 28 students in Geography and History. [5]

Answer TRUE/FALSE to the statements.



- In Geography more students scored between 60 and 75 than between 55 and 60. F
- 75% of students in History scored from 60 to 85 marks. T
- In History, 14 students scored more or the same mark, as the median mark in Geography. F
- More students scored 60 or more in History than they did in Geography. T
- The interquartile range for Geography is five less than the interquartile range for history. F

4. The times two sprinters take to run $100m$ are as follows:

Runner A:	11.9	12.0	12.0	12.1	12.2	12.3	12.7	15.2
Runner B:	12.3	12.3	12.3	12.5	12.6	12.8	12.9	13.1

For each of the runners, find the:

(a) Interquartile range [2]

A 0·5

B 0·55

(b) Standard deviation [2]

A 1·03

B 0·29

(c) Mean time [2]

A 12·55

B 12·6

(d) Which runner is more consistent? Why? [2]

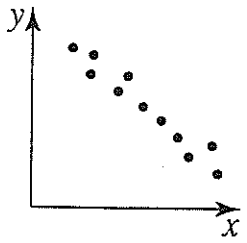
Runner B is more consistent because the standard deviation is much lower.

(e) Which runner is the better sprinter? Give reasons. [2]

Considering the mean of both, Runner B is no better than A.

Runner A's results may be affected by the outlier of 15·2.

5. (a) Describe the relationship shown in the scatter plot. [2]



strong negative

(c) Give an example of two variables that could follow such a relationship. [1]

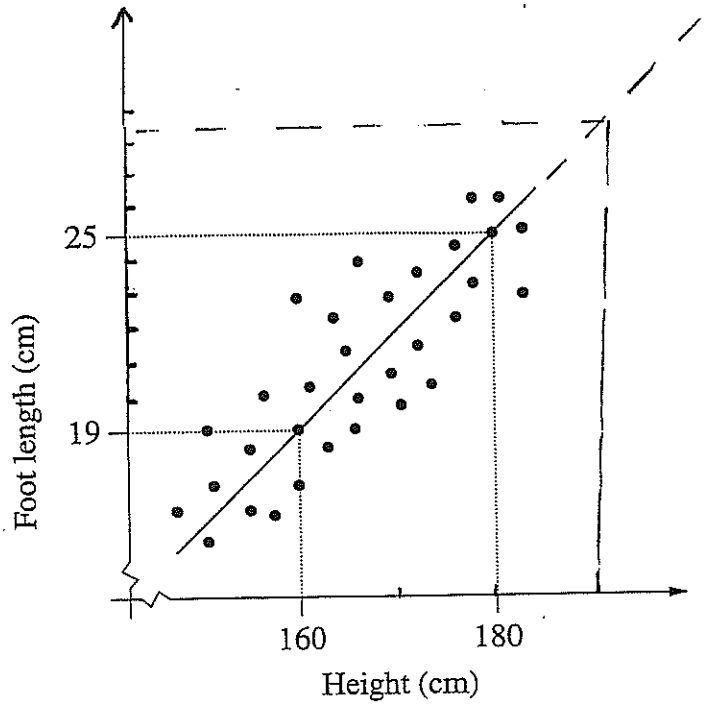
eg. Weight of car / Fuel efficienc

eg. Vaccinations / Illness

eg. Grades / Absences

6.

Each member of a group of males had his height and foot length measured and recorded. The results were graphed.



Each member of a group of males had his height and foot length measured and recorded. The results were graphed.

(a) What is the line called? [1]

Line of best fit.

(b) Using the point gradient formula find the equation of the line. [2]

$m = \frac{25-19}{180-160}$ (160, 19) (180, 25)

$= 0.3$

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

$y - 19 = 0.3(x - 160)$

$y - 19 = 0.3x - 48$

$y = 0.3x - 29$

$F = 0.3H - 29$

(c) **Use the graph** to extrapolate the foot length of a male with a height of 190*cm*. [1]

28cm or 29 cm

7. Describe one way that a graph could be drawn that could make it misleading or exaggerated. [2]

1 mark for
2 marks for a full sentence.

- incorrect scale on axis
- vertical scale not starting from zero
- use of 3D columns to exaggerate.

✱ 8. Jade scored 82% in both her Maths and English exams. The mean of both exams is 70%. If the standard deviation of the Maths exam is 5% and the standard deviation of the English exam is 12%, in which subject did Ja perform better. Give reasons. [2]

Jade performed better in the Maths exam.

Since the SD is 5%, it is more than two standard deviations above the mean.

The English result is only one standard deviation above the mean.

Maths result is more standard deviations above the mean compared to English.