Sydney Technical High School

Mathematics

YEAR 10 ASSESSMENT TASK 2

AUGUST ~~2012~~ 2011

Instructions

- Part A-Non Calculator - **25 minutes**
- Parts B and C - calculators permitted - **45 minutes.** <u>Show necessary working</u>.
- Use a <u>pen only</u> and a <u>ruler</u> for straight lines.
- Marks shown are a guide and may need to be adjusted.
- Full marks may <u>not</u> be awarded for <u>careless</u> work or <u>illegible</u> writing.

Name_____

Teacher_____

A/ Non-calc.	B/ Surface Area/Volume	C/ Statistics	TOTAL
/34 33	/21	/21	/76 75

PART A   Non- Calculator (34 marks – 1 each)

Question	Answer Only
1. Evaluate 0.2^3	
2. Which fraction is halfway between $\frac{1}{4}$ and $\frac{1}{6}$?	
3. Find $13\frac{1}{2}\%$ of $300.	
4. Evaluate $50 \div 0.05$	
5. Expand and fully simplify $(3 - \sqrt{5})^2$	
6. What is the exact value of $\tan 45°$?	
7. Write 26850 correct to 2 significant figures.	
8. Find x such that $4.36 \times 10^x = 0.00436$	
9. What is the equation of the horizontal line through (-2,5)?	
10. A cube has a surface area of $150\ cm^2$. Find its volume.	
11. Solve: a) $14 = 11 + 0.4x$	a)
b) $\dfrac{4x-3}{5} < x$	b)

12. Evaluate $\dfrac{1}{1+\dfrac{1}{1+\frac{1}{3}}}$

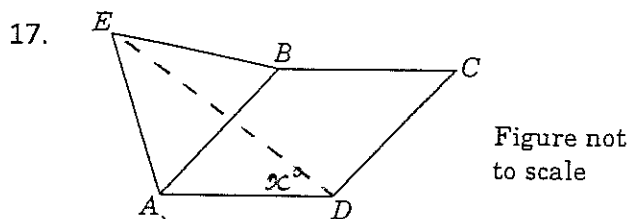13. Evaluate $16^{-\frac{3}{2}}$

14. Solve : a) $x - 5x^2 = 0$

a)

   b) $2x^2 - 1 = 9$

b)

15. Simplify $\dfrac{x^2-x}{x^2-1}$
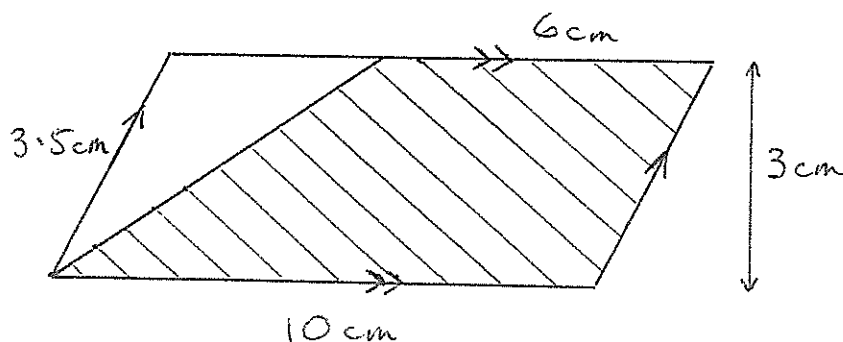
16. What is the gradient of the line $3x + y - 6 = 0$?

17.

Figure not to scale

$ABCD$ is a rhombus with $\angle BCD = 48°$.
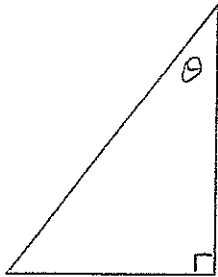ABE is an equilateral triangle

Find the value of x.

18. In a family of 3 children, what is the probability of having 2 boys and 1 girl?

19. Calculate the shaded area.

20. A car depreciates by 20% each year. What percentage of its original value is the car worth after 2 years?

21.

If $\cos\theta = \dfrac{5}{7}$ in this triangle, what is the value of $\sin\theta$?

22. Find $\emptyset$, ∂, Δ if $(\emptyset + \partial)^2 = 4x^2 + 20x + \Delta$

(need all 3 correct for 1 mark)

$\emptyset =$

$\partial =$

$\Delta =$

23. When 2 dice are tossed, what is the probability that a total score of 9 is shown?

24. Simplify $\dfrac{x - \frac{1}{2}}{x + \frac{1}{3}}$

25. a) Solve $x^2 - 4x + 3 = 0$

a)

b) What is the smallest possible value of $x^2 - 4x + 3$, for any x substituted?

b)

26. Write another score to make the range equal to the mode.

9, 9, 10, 11, 11, 11, 12

27. A man sells a book for $21 and loses 10% on the cost price of the book.

How much did the man lose?

28. If the operation $*$ is defined by $x * y = \frac{y}{x}$, find $(x * y) * m$. Simplify your answer.

29. Complete: $x^n + x^{n-1} = \boxed{} \times x^{n-1}$

30. Find the answer to: $1000 + 999 - 998 + 997 - 996 + \ldots\ldots\ldots + 3 - 2 + 1$

Answer_____

End of Non-Calc. Section

PART A   Non-Calculator (34 marks – 1 each)

ANSWERS

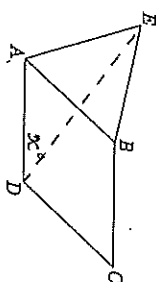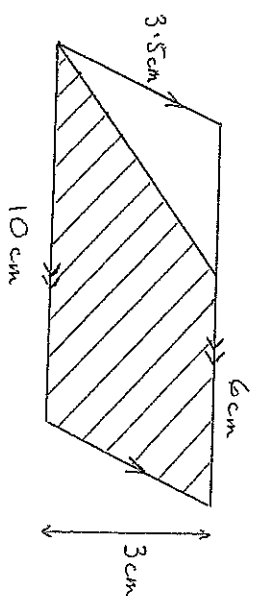| Question	Answer Only
1. Evaluate 0.2^3	0.008
2. Which fraction is halfway between $\frac{1}{4}$ and $\frac{1}{6}$?	$\frac{5}{24}$
3. Find $13\frac{1}{2}\%$ of $300.	$40.50
4. Evaluate $50 \div 0.05$	1000
5. Expand and fully simplify $(3-\sqrt{5})^2$	$14-6\sqrt{5}$
6. What is the exact value of $\tan 45°$?	1
7. Write 26850 correct to 2 significant figures.	$27\,000$
8. Find x such that $4.36 \times 10^x = 0.00436$	-3
9. What is the equation of the horizontal line through (-2,5)?	$y=5$
10. A cube has a surface area of $150\ cm^2$. Find its volume.	$125\ cm^3$
11. Solve: a) $14 = 11 + 0.4x$	a) $x = 7\frac{1}{2}$
b) $\frac{4x-3}{5} < x$	b) $x > -3$
12. Evaluate $\dfrac{1}{1 + \frac{1}{1+\frac{1}{3}}}$	$\frac{4}{7}$
13. Evaluate $16^{-\frac{3}{2}}$	$\frac{1}{64}$
14. Solve : a) $x - 5x^2 = 0$	a) $x = 0, \frac{1}{5}$
b) $2x^2 - 1 = 9$	b) $x = \pm\sqrt{5}$
15. Simplify $\dfrac{x^2-x}{x^2-1}$	$\dfrac{x}{x+1}$ (must have both)
16. What is the gradient of the line $3x + y - 6 = 0$?	-3
17. $ABCD$ is a rhombus with $\angle BCD = 48°$. ABE is an equilateral triangle. Find the value of x.	$36°$
18. In a family of 3 children, what is the probability of having 2 boys and 1 girl?	$\frac{3}{8}$
19. Calculate the shaded area.	$24\ cm^2$

20. A car depreciates by 20% each year. What percentage of its original value is the car worth after 2 years?

64%

21.
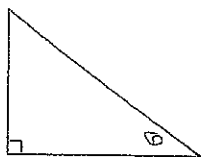
If $\cos\theta = \frac{5}{7}$ in this triangle, what is the value of $\sin\theta$?

$\frac{\sqrt{24}}{7}$ or $\frac{2\sqrt{6}}{7}$

22. Find $\emptyset$, ∂, Δ if $(\emptyset + \partial)^2 = 4x^2 + 20x + \Delta$

(need all 3 correct for 1 mark)

$\emptyset = 2x$

$\partial = 5$

$\Delta = 25$

23. When 2 dice are tossed, what is the probability that a total score of 9 is shown?

$\frac{4}{36}$ or $\frac{1}{9}$

24. Simplify $\dfrac{x - \frac{1}{2}}{x + \frac{1}{3}}$

$\dfrac{6x - 3}{6x + 2}$

25. a) Solve $x^2 - 4x + 3 = 0$

a) $x = 1, 3$

b) What is the smallest possible value of $x^2 - 4x + 3$, for any x substituted?

b) -1

26. Write another score to make the range equal to the mode.

9, 9, 10, 11, 11, 11, 12

20 or 1

27. A man sells a book for $21 and loses 10% on the cost price of the book.

How much did the man lose?

$2·33

28. If the operation $*$ is defined by $x * y = \frac{y}{x}$, find $(x * y) * m$. Simplify your answer.

$\dfrac{mx}{y}$

29. Complete: $x^n + x^{n-1} = \boxed{x + 1} \times x^{n-1}$

30. Find the answer to: $1000 + 999 - 998 + 997 - 996 + \ldots\ldots\ldots + 3 - 2 + 1$
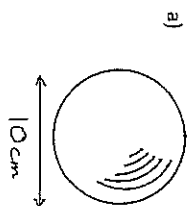
Answer $\underline{1500}$

End of Non-Calc. Section

PART B – SURFACE AREA and VOLUME (21 marks)

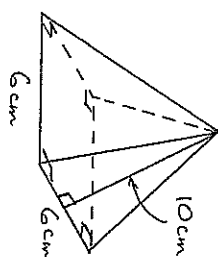1. A fuel tank has a capacity of 70 litres. What is its volume in m³?   1

$$0 \cdot 07 \, m^3$$

2. Find the surface area of each solid:

a)

10cm

b)

10cm   13cm

c)

6cm   10cm   6cm
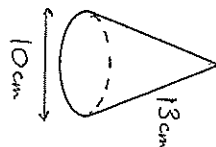
$$100 \pi \left(314 \cdot 2\right) cm^2$$ $$90 \pi \left(282 \cdot 7\right) cm^2$$ $$(156 \, cm^2)$$ 3

3. Find the volume of the cone in Q2 b) above. $$100 \pi \left(314 \cdot 2\right) cm^3$$ 1

c) Find the length of one of the long   d) Find the total surface area (1 dec. place).   2
sloping edges, in surd form.   1

$$\sqrt{116} \, cm$$ $$\left(38 \cdot 43 \times 2\right) + 24 + 2 \times 4 \times \sqrt{116} + \left(\pi \, r \, l \times 4\right)$$

possible ECF $$= 197 \cdot 6 \, cm^2$$
from a)

4. A solid consists of a cylinder on top of a hemisphere as shown.

4cm
6cm
9cm
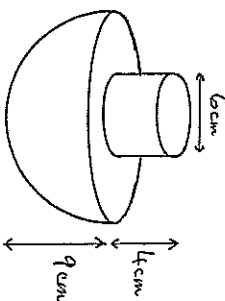
Find, in terms of π:

a) the volume of the solid.   2

$$\frac{2}{3} \pi r^3 + \pi r^2 h$$

$$= \frac{2}{3} \pi \times 729 + \pi \times 9 \times 4$$
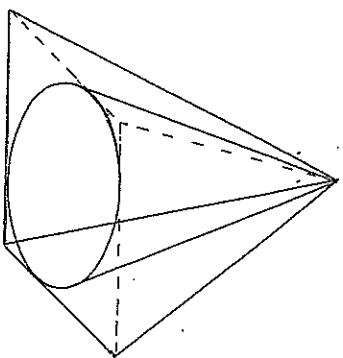
$$= 486 \pi + 36 \pi$$

$$= 522 \pi \, cm^3$$

b) the surface area of the solid.   3

$$2 \pi r^2 + \pi r^2 + 2 \pi r h$$

$$= 2 \pi \times 81 + \pi \times 81 + 2 \pi \times 3 \times 4$$

$$= 162 \pi + 81 \pi + 24 \pi$$

$$= 267 \pi \, cm^2$$

4.

10cm
3cm   3cm
2cm   4cm

a) Find the area of the front face of   2
this solid. (2 dec.)

$$\frac{1}{2} \times 8 \times 10 - \frac{1}{2} \times \pi \times l^2$$

$$= 38 \cdot 43 \, cm^2$$

b) Find the volume of the solid. (2 dec.) 1
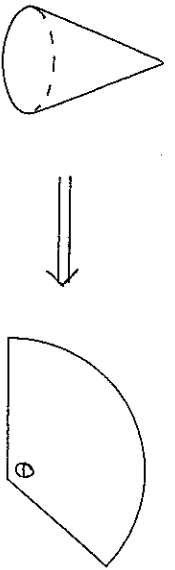
$$(Area) \times 4 = 153 \cdot 72 \, cm^3$$

5.

A cone, inside a pyramid, has the same base
and height dimensions as shown.
What percentage of the pyramid's volume
is occupied by the cone? (1 dec.)   3

$$\frac{1}{3} \pi r^2 \rlap{\diagdown} h \times \frac{1}{4 \, r^2 \rlap{\diagdown} h} \times (\times 100\%)$$

$$= \frac{\pi}{4} (\times 100\%)$$

$$= 78 \cdot 5\%$$

6. A cone, with diameter 8 cm and slant height 10 cm, is cut along its slanting edge and the curved surface opened out to form the sector net with central angle θ degrees.

Find θ, to the nearest degree.

Either: $\frac{\theta}{360} \times 20\pi = 8\pi$ OR $\frac{\theta}{360} \times 100\pi = 40\pi$

$20\theta = 2880$ $100\pi = 14400$

$\theta = 144°$ $\pi = 144°$

PART C – STATISTICS (21 marks)
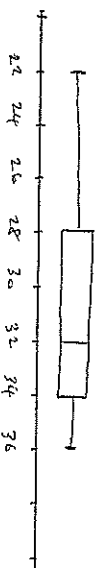
1. The results gained by the students in two classes A and B on a test are shown below:
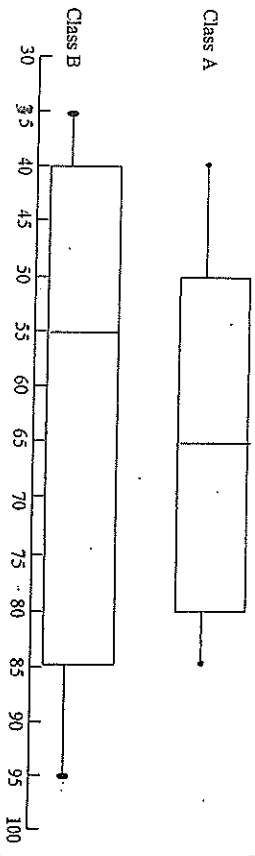
Class A

Class B

a) What is the range for class B?   60   1

b) What is the interquartile range for class B?   45   1

c) What percentage of scores are greater than 50 in class A?   75%   1

d) What is the difference in medians for the two classes?   10   1

2.

Score	Frequency
22	3
24	1
26	2
28	6
30	4
32	10
34	4
36	6

Use the line provided below and construct a box-and-whisker plot for this table of scores.

<u>Use a ruler and be neat.</u>   3

3. The cumulative frequency histogram below shows the increasing percentage enrolment for Years 5 to 12 at Example High School.

Use a ruler to draw in the ogive (c.f. polygon) and find the:
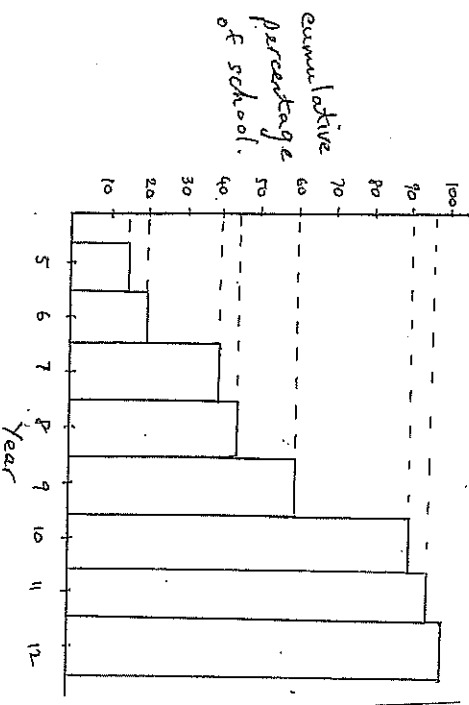
Find the: a) range.   7   1   b) mode   10   1

c) median.   9   1

d) upper quartile.   10   1

e) interquartile range $10-7 = 3$ 1

4. The back-to-back stem-and-leaf plot below shows the marks obtained on a class assignment.

MARKS OBTAINED

Girls						Boys				
				0	8					
9	7	4	6	1	7	4	7			
8	8	5	3	2	0	4	4	6	9	
7	5	5	2	3	3	2	4	1	3	5
				4	1	3	5			

a) How many students are in the class?   26   1

b) What is the range of marks for this assignment?   39   1

c) What is the difference in medians between boys and girls? 4   1

d) What is the median for the whole class?   34.5   1

5. Each of the sets A, B, C below has a mean of 7. Arrange the sets in order of increasing standard deviation.

Set A   Set B   Set C
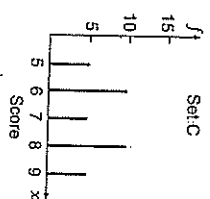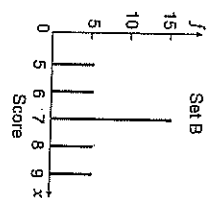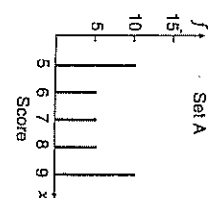
Answer B, C, A   1

6. For these scores, use your calculator to find the standard deviation (1 dec. place):

18, 12, 15, 17, 17, 2, 20.

Answer 5.6   1

7. For a set of data, the mean is 10 and the standard deviation is 3.8.

A new score of 11 is now included in the scores. Choose the correct statement:

A/ the mean increases, s.d. increases.   B/ the mean increases, s.d. decreases.

C/ the mean decreases, s.d. increases.   D/ the mean decreases, s.d. decreases.
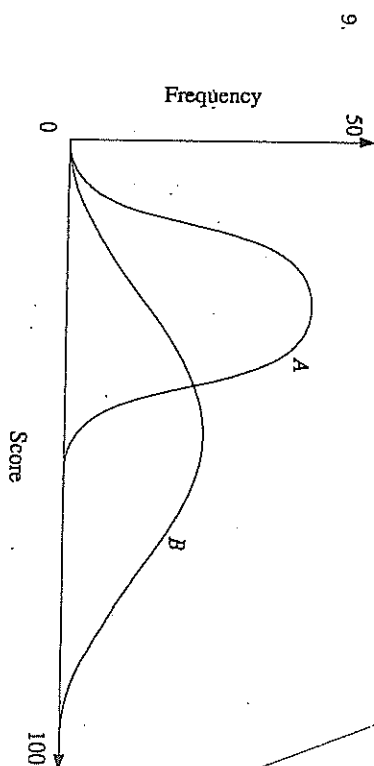
Answer B   1

8. A researcher misread a measuring device and consequently 2 cm was added to each reading in a set of data. The mistake was picked up and the 2 cm was then subtracted from each piece of data in the set.

Which of the following statements about the change in the data is true?

A/ The mean decreased and the standard deviation remained the same.

B/ The mean decreased and the standard deviation decreased.

C/ The mean increased and the standard deviation decreased.

D/ The mean increased and the standard deviation increased.

Answer A   1

9.

The graph shows the frequency curves for two sets of test results, A and B.

$\bar{x}_A$ = mean of A σ_A = standard deviation of A
$\bar{x}_B$ = mean of B σ_B = standard deviation of B

Which of the following is true?

(A) $\bar{x}_A > \bar{x}_B$ and $\sigma_A < \sigma_B$ (B) $\bar{x}_A < \bar{x}_B$ and $\sigma_A > \sigma_B$

(C) $\bar{x}_A < \bar{x}_B$ and $\sigma_A < \sigma_B$ (D) $\bar{x}_A > \bar{x}_B$ and $\sigma_A > \sigma_B$

Answer C

END OF TEST