St Catherine's School Waverley

Year: 10
Pathways: A, B &C
Time Allowed: 55 minutes
Date: March 12th 2008

Name: _____

Teacher : _____

Directions to students:

- All questions are to be attempted.
- Not all questions are of equal value.
- All necessary working must be shown.
- Full marks may not be awarded for careless or badly arranged work.
- Answer questions in the spaces provided.
- Approved calculators may be used.

TEACHER'S USE ONLY Total Marks	
Section 1	/20
Section 2	/13
Section 3	/12
TOTAL	/35 45

Year 10 Mathematics March 2008
Pathway A B C Test
Time allowed: **55** minutes

Name: _____

Section A Surds (20 marks)

1-6 Multiple Choice (1 mark each)

1 $\sqrt{18.179}$ correct to 2 decimal places is:

A 326.85
B 4.26
C 4.15
D 4.27

2 Which of the following surds, when simplified, will equal $7\sqrt{3}$?

A $\sqrt{147}$
B $\sqrt{441}$
C $\sqrt{21}$
D $\sqrt{63}$

3 $(\sqrt{2}+1)^2$ is equal to:

A 3
B $2\sqrt{2}+5$
C $2\sqrt{2}+3$
D $3+\sqrt{2}$

4 $2\sqrt{75}-4\sqrt{12}$ is equal to:

A $-2\sqrt{63}$
B $\sqrt{150}-\sqrt{48}$
C $6\sqrt{5}-12\sqrt{4}$
D $2\sqrt{3}$

5 $11\sqrt{3}\left(\sqrt{3}-2\sqrt{5}\right)$ equals?

A $11\sqrt{3}-22\sqrt{15}$
B $33-22\sqrt{15}$
C $11\sqrt{3}-22\sqrt{8}$
D $11\sqrt{3}-22\sqrt{15}$

6 $\frac{4}{\sqrt{7}}$ expressed with a rational denominator is:

A $\frac{\sqrt{7}}{4}$
B $4\sqrt{7}$
C $\frac{\sqrt{28}}{7}$
D $\frac{4\sqrt{7}}{7}$

7 Simplify the following:

(a) $\sqrt{50}+3\sqrt{32}$

(a) 2

(b) $7\sqrt{24}-3\sqrt{54}$

(b) 2

8 Simplify the following:

(a) $2\sqrt{6}\times 4\sqrt{3}$

(a) 2

(b) $6\sqrt{5}\times\sqrt{10}\div 3\sqrt{2}$

(b) 2

9 Expand the following and simplify where appropriate:

(a) $\sqrt{7}\left(\sqrt{2}+3\sqrt{7}\right)$

(a) _____ 1

(b) $(2\sqrt{5}+3)(2\sqrt{5}-3)$

(b) _____ 2

10 Express the following fractions in simplest form with a rational denominator:

(a) $\dfrac{1}{2\sqrt{7}}$

(a) _____ 1

(b) $\dfrac{\sqrt{2}-7}{\sqrt{7}}$

(b) _____ 2

Section B Data (13 marks)

1-4 Multiple Choice (1 mark each)

1 The difference between the mean and mode of 30,60,50,30,70 is

A 2

B 12

C 18

D 20

2 For the scores 8,10,12,15,18,20,24 the interquartile range is

A 16

B 15

C 10

D 20

3 The range of 10,12,x,14 and 16 is 12 The value of x could be

A 22

B 28

C 13

D 2

4 Five girls in a tug of war team have a mean mass of 50Kg. A sixth girl joins the team and the mean is now 60Kg. The mass of the new girl is

A 55Kg

B 70Kg

C 110Kg

D 90Kg

5 The number of pushups per day done by Alice was recorded and organised into a stem and leaf plot as shown.

Stem	Leaf
4	2 5
5	0 2 4 5 7 7 7
6	3 5 6 8 8 9
7	4 5 6
8	1 3 4
9	0
10	9

a) For how many days were results recorded? _____ 1

b) What is the **Modal** number of pushups? _____ 1

c) What is the **Range** of pushups done by Alice? 1

_____

6 **a)** Place this data from Question 5 into this grouped frequency distribution table using groups 40-49, 50-59 etc. and complete the table. 2

Class	Class centre	Frequency	Freq X Score	Cumulative Frequency
40-49				
50-59				
60-69				
70-79				
80-89				
90-99				
100-109				

b) Use this table to calculate the mean number of pushups done by Alice each day. 2

2

c) On the graph paper supplied construct a cumulative frequency histogram.

GRID PAPER FOR STATISTICS

Section C Coordinate Geometry (12 marks)

Multiple Choice (5 marks)

1 A line that is perpendicular to another line with gradient -4 has a gradient of

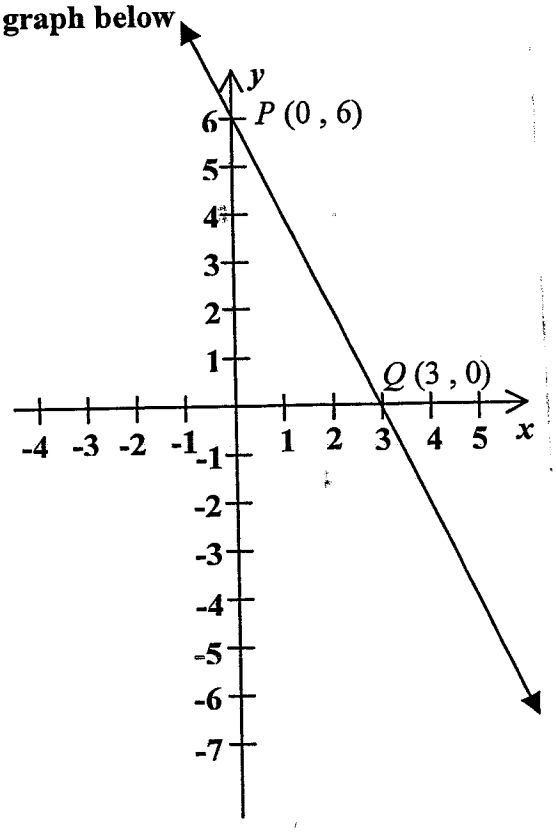
E -1

F 4

G $\frac{1}{4}$

H $-\frac{1}{4}$

QUESTIONS 2 to 4 refer to the graph below



2 The length of PQ is closest to:

A 6.8 units

B 45 units

C 9 units

D 6.7 units

3 The gradient of the interval PQ is:

A $-\frac{1}{2}$

B $\frac{1}{2}$

C 2

D -2

4 The midpoint of the interval PQ is:

A (3, 6)

B (0, 3)

C (1.5, 3)

D (1.5,-3)

5 A is the point (2,6) and C the midpoint of AB is (0,2)
The coordinates of B are:

A (1,4)

B (2,2)

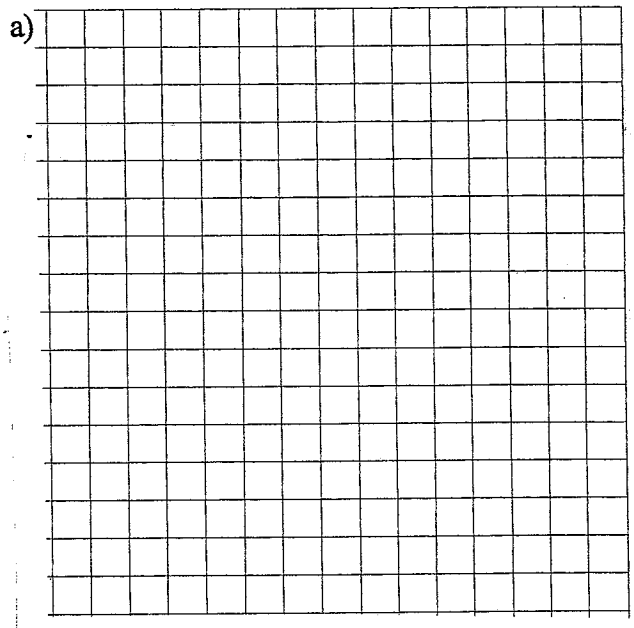
C (-2,-2)

D (-2,-4)

6 The vertices of a triangle are $A(-3, -2)$, $B(3, 1)$ and $C(0, 4)$.

a) Plot and label these points on the number plane given and draw the triangle.

a)



2

b) Find the lengths of the 3 sides AB, AC and BC.

3

c) What type of triangle is it? (give reasons for your answer)

2

Year 10 Mathematics March 2008
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Name: MASTER COPY
SOLUTIONS.

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1-6 Multiple Choice (1 mark each)

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A 326.85
(B) 4.26
C 4.15
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A $-2\sqrt{63}$
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C $6\sqrt{5}-12\sqrt{4}$
(D) $2\sqrt{3}$

5 $11\sqrt{3}\left(\sqrt{3}-2\sqrt{5}\right)$ equals?

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(B) $33-22\sqrt{15}$
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A $\frac{\sqrt{7}}{4}$
B $4\sqrt{7}$
C $\frac{\sqrt{28}}{7}$
(D) $\frac{4\sqrt{7}}{7}$

6

7 Simplify the following:

(a) $\sqrt{50}+3\sqrt{32}$

(a) $\sqrt{25}\times\sqrt{2}+3\times\sqrt{16}\times\sqrt{2}$ 2
$=5\sqrt{2}+12\sqrt{2}$
$=17\sqrt{2}$ ✓ 2

(b) $7\sqrt{24}-3\sqrt{54}$

(b) $7\times\sqrt{4}\times\sqrt{6}-3\times\sqrt{9}\times\sqrt{6}$ 2
$=7\times2\times\sqrt{6}-3\times3\times\sqrt{6}$
$=14\sqrt{6}-9\sqrt{6}$ 2
$=5\sqrt{6}$ ✓

8 Simplify the following:

(a) $2\sqrt{6}\times4\sqrt{3}$

(a) $=8\sqrt{18}$ 2
$=8\times\sqrt{9}\times\sqrt{2}$
$=8\times3\times\sqrt{2}$ 2
$=24\sqrt{2}$ ✓

(b) $6\sqrt{5}\times\sqrt{10}\div3\sqrt{2}$

(b) $=6\sqrt{50}\div3\sqrt{2}$ 2
$=2\sqrt{25}$
$=2\times5$ ✓ 2
$=10$

8

9 Expand the following and simplify where appropriate:

(a) $\sqrt{7}\left(\sqrt{2}+3\sqrt{7}\right)$

(a) $\sqrt{14}+3\times7$ 1

$=\sqrt{14}+21$ ✓ 1

(b) $(2\sqrt{5}+3)(2\sqrt{5}-3)$

(b) $(2\sqrt{5})^2-3^2$ 2

$4\sqrt{25}-9$

$=4\times5-9$

$=20-9$

$=11$ ✓ 2

10 Express the following fractions in simplest form with a rational denominator:

(a) $\frac{1}{2\sqrt{7}}$

(a) $\frac{1}{2\sqrt{7}}\times\frac{\sqrt{7}}{\sqrt{7}}$ 1

$=\frac{\sqrt{7}}{2\times7}$

$=\frac{\sqrt{7}}{14}$ ✓ 1

(b) $\frac{\sqrt{2}-7}{\sqrt{7}}$

(b) $=\frac{\sqrt{2}-7}{\sqrt{7}}\times\frac{\sqrt{7}}{\sqrt{7}}$ 2

$=\frac{\sqrt{7}(\sqrt{2}-7)}{7}$

$=\frac{\sqrt{14}-7\sqrt{7}}{7}$ ✓ 2

6

Section B Data (13 marks)

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B 12

(C) 18 ✓

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5 The number of pushups per day done by Alice was recorded and organised into a stem and leaf plot as shown.

Stem	Leaf
4	2 5
5	0 2 4 5 7 7 7
6	3 5 6 8 8 9
7	4 5 6
8	1 3 4
9	0
10	9

a) For how many days were results recorded? 23 ✓ 1

b) What is the **Modal** number of pushups? 67 ✓ 1

c) What is the **Range** of pushups done by Alice? 1

67

✓ 3

6 a) Place this data from Question 5 into this grouped frequency distribution table using groups 40-49, 50-59 etc. and complete the table. 2

Class	Class centre (x)	Frequency	Freq X Score	Cumulative Frequency
40-49	45	2	90	2
50-59	55	7	385	9
60-69	65	6	390	15
70-79	75	3	225	18
80-89	85	3	255	21
90-99	95	1	91	22
100-109	105	1 ✓	105	23 ✓

$\Sigma f = 23$ $\Sigma fx = 1541$

1½

b) Use this table to calculate the mean number of pushups done by Alice each day. 2

$1541 \div 23$

$= 67$

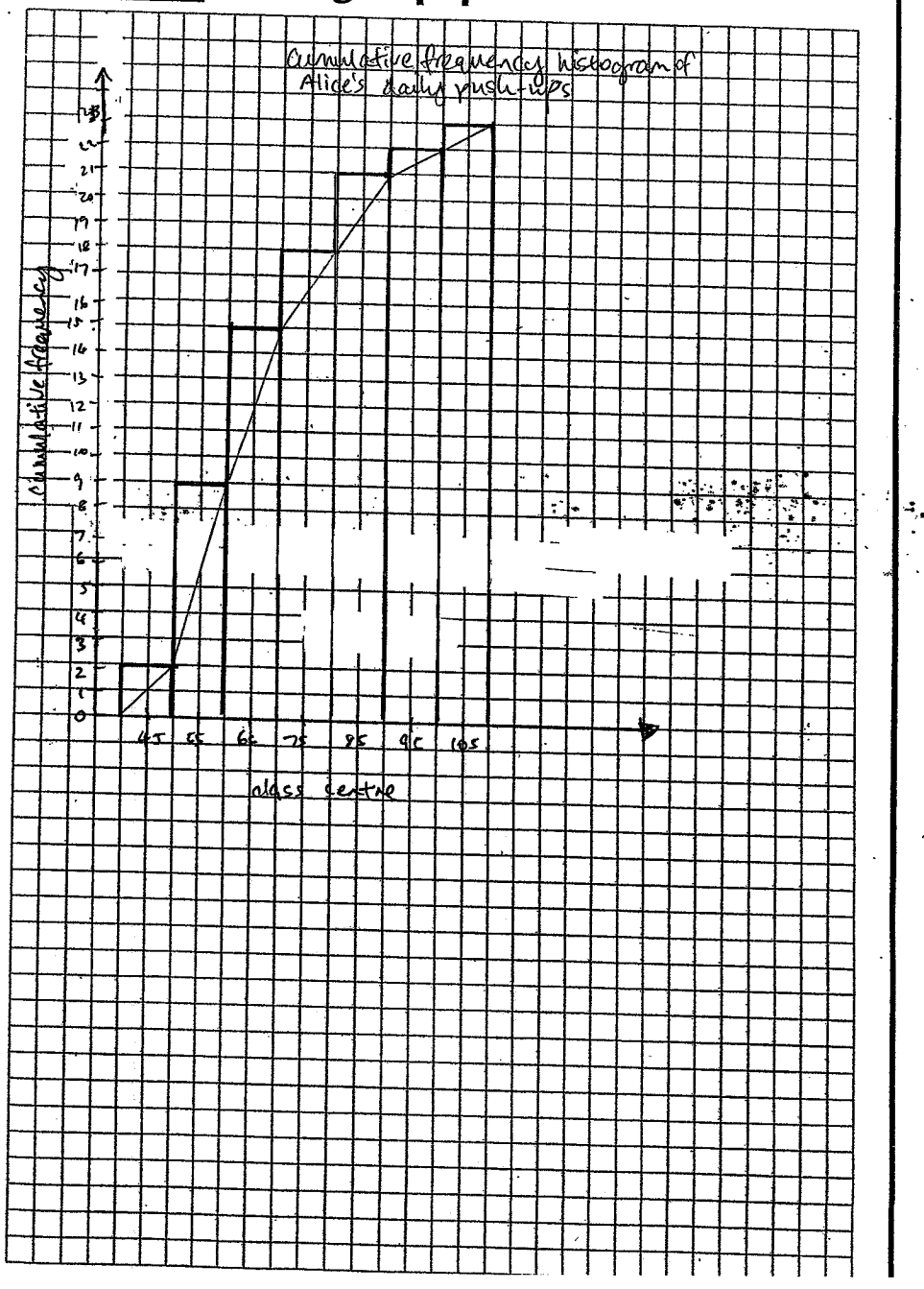
∴ Alice did an average of 67 pushups per day

(2) 2

c) On the graph paper supplied construct a cumulative frequency histogram.

/ (2)

Appendix 6 **5 mm grid paper**



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Multiple Choice (5 marks)

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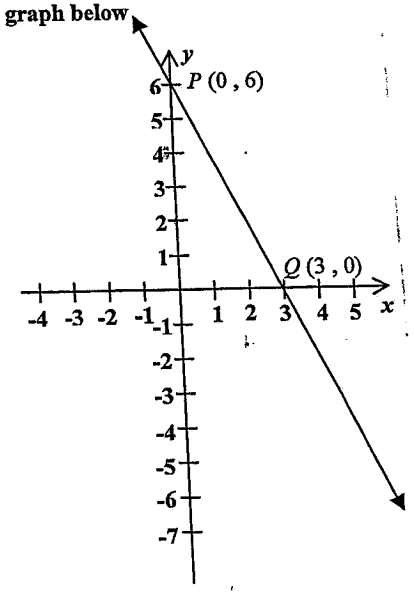

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D 6.7 units ✓

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D -2 ✓

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The coordinates of B are:

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C (-2,-2) ✓

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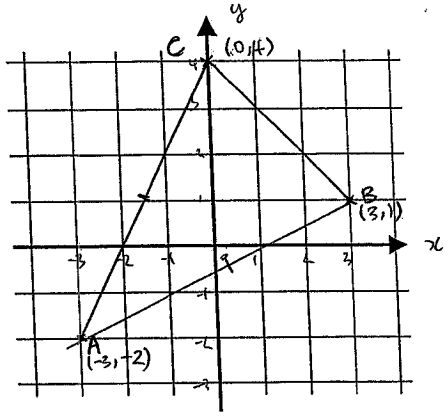
6 The vertices of a triangle are $A(-3, -2)$, $B(3, 1)$ and $C(0, 4)$. 2

a)

a) Plot and label these points on the number plane given and draw the triangle.



✓ 2

b) Find the lengths of the 3 sides AB, AC and BC. 3

length of AB

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$= \sqrt{(3--3)^2+(1--2)^2}$
$= \sqrt{6^2+3^2}$
$= \sqrt{45}$
$= 6.7$ units (1d.p)

length of AC

$d = \sqrt{(0--3)^2+(4--2)^2}$
$= \sqrt{3^2+6^2}$
$= \sqrt{9+36}$
$= \sqrt{45}$
$= 6.7$ units (1d.p)

length of BC

$d = \sqrt{(3-0)^2+(1-4)^2}$
$= \sqrt{3^2+(-3)^2}$
$= \sqrt{9+9}$
$= \sqrt{18}$
$= 4.2$ units (1d.p)

✓ ✓ ✓ 3

c) What type of triangle is it? (give reasons for your answer) 2

The triangle is isosceles as the length of AB and AC are equivalent. (both 6.7 units) ✓
and because an isosceles triangle is a triangle with 2 equal sides
only, this therefore proves that $\triangle ABC$ is an isosceles triangle. 2