

# 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	<del>/35</del> 45

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

-St Catherine's Year 10 Pathway A,B,C march test

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  $11\sqrt{3}(\sqrt{3}-2\sqrt{5})$  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  $\frac{4\sqrt{7}}{7}$

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7 Simplify the following:

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

(a)

2

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

(b)

2

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8 Simplify the following:

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

(a)

2

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

(b)

2

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9 Expand the following and simplify where appropriate:

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

(a) \_\_\_\_\_ 1

\_\_\_\_\_

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

(b) \_\_\_\_\_ 2

\_\_\_\_\_

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

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

(a) \_\_\_\_\_ 1

\_\_\_\_\_

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

(b) \_\_\_\_\_ 2

\_\_\_\_\_

\_\_\_\_\_

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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.

a) For how many days were results recorded? \_\_\_\_\_

b) What is the Modal number of pushups? \_\_\_\_\_

c) What is the Range of pushups done by Alice?  
\_\_\_\_\_

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

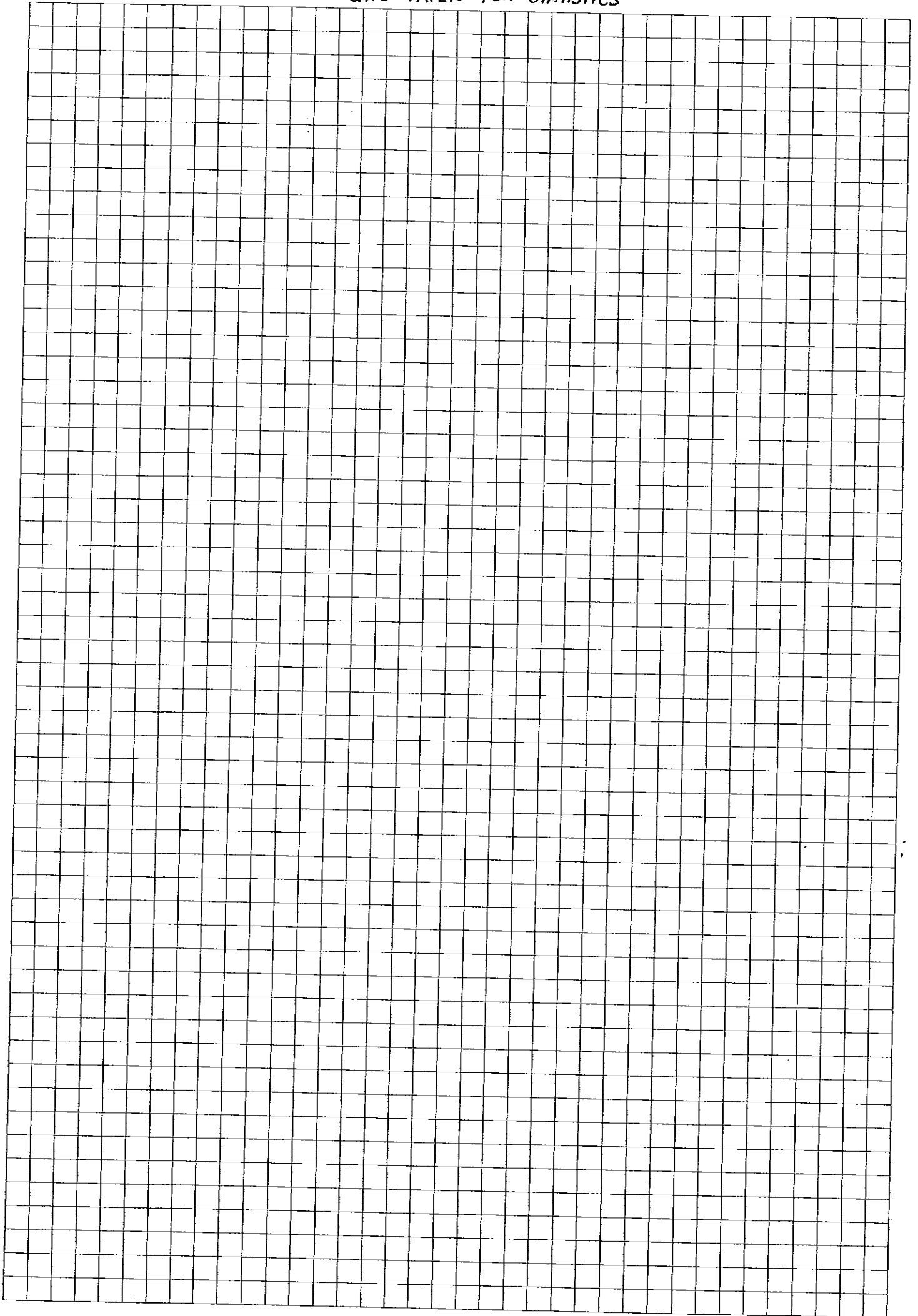
6 a) Place this data from Question 5 into this grouped frequency distribution table using groups 40-49, 50-59 etc. and complete the table. 2

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

c) On the graph paper supplied construct a cumulative frequency histogram. 2

GRID PAPER FOR STATISTICS

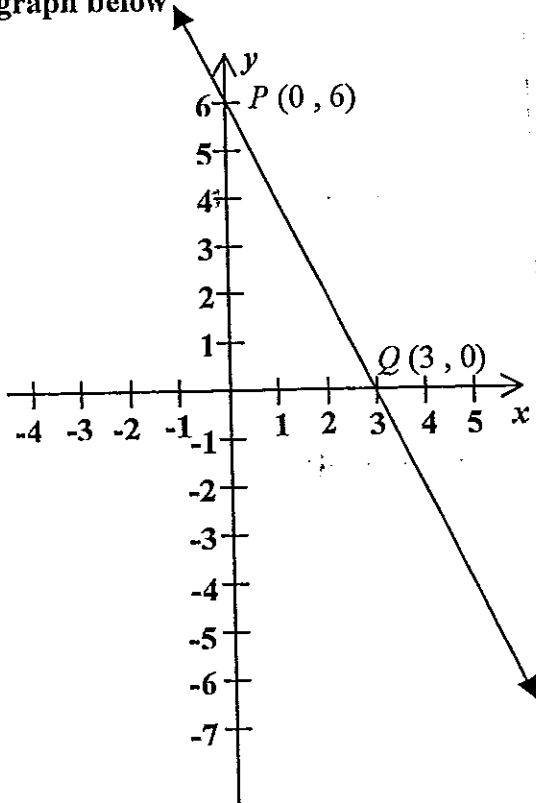


Section C Coordinate Geometry (12 marks)

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

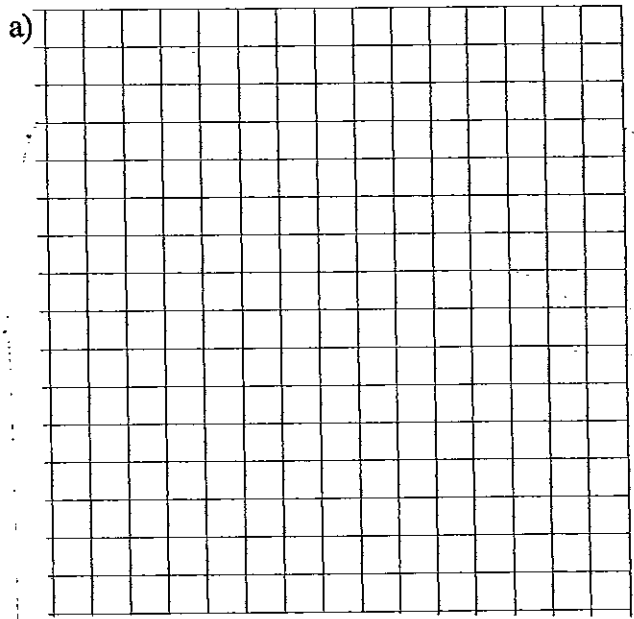


- 2 The length of  $PQ$  is closest to:
- A 6.8 units
  - B 45 units
  - C 9 units
  - D 6.7 units
- 3 The gradient of the interval  $PQ$  is:
- A  $-\frac{1}{2}$
  - B  $\frac{1}{2}$
  - C 2
  - D  $-2$
- 4 The midpoint of the interval  $PQ$  is:
- A (3, 6)
  - B (0, 3)
  - C (1.5, 3)
  - D (1.5, -3)
- 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.



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

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 Seat No:         

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  $11\sqrt{3}(\sqrt{3}-2\sqrt{5})$  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)

$$\frac{\sqrt{25} \times \sqrt{2} + 3 \times \sqrt{16} \times \sqrt{2}}{= 5\sqrt{2} + 12\sqrt{2}}$$

17\sqrt{2} ✓ 2

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

(b)

$$\frac{7 \times \sqrt{4} \times \sqrt{6} - 3 \times \sqrt{9} \times \sqrt{6}}{= 7 \times 2 \times \sqrt{6} - 3 \times 3 \times \sqrt{6}}$$

$$= 14\sqrt{6} - 9\sqrt{6}$$

$$= 5\sqrt{6}$$

5\sqrt{6} ✓ 2

- 8 Simplify the following:

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

(a)

$$\frac{8 \times \sqrt{18} \times \sqrt{2}}{= 8 \times 3 \times \sqrt{2}}$$

$$= 24\sqrt{2}$$

24\sqrt{2} ✓ 2

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

(b)

$$\frac{6 \times \sqrt{50} \div 3 \times \sqrt{2}}{= \frac{2\sqrt{25}}{= 2 \times 5}}$$

$$= 10$$

10 ✓ 2

6

8

9 Expand the following and simplify where appropriate:

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

(a)  $\frac{\sqrt{14} + 3\sqrt{49}}{\sqrt{14} + 21}$  ✓

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

(b)  $\frac{(2\sqrt{5})^2 - 3^2}{4\sqrt{25} - 9}$   
 $= \frac{4 \times 5 - 9}{20 - 9}$   
 $= \frac{11}{11} = 1$  ✓

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

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

(a)  $\frac{1}{2\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$   
 $= \frac{\sqrt{7}}{2 \times 7}$   
 $= \frac{\sqrt{7}}{14}$  ✓

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

(b)  $\frac{\sqrt{2}-7}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$   
 $= \frac{\sqrt{14}-7\sqrt{7}}{7}$   
 $= \frac{\sqrt{14}-7\sqrt{7}}{7}$  ✓

Section B Data (13 marks)

1-4 Multiple Choice (1 mark each)

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

(6)

(4)

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

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

b) What is the Modal number of pushups? 57 ✓

c) What is the Range of pushups done by Alice? 67 ✓

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 $\frac{(k_1+k_2)}{2}$	Frequency	Freq X Score	Cumulative Frequency
40-49	44.5	2	89	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	95	22
100-109	105	1	105	23

$\Sigma f = 23$       $\Sigma fx = 1444$

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

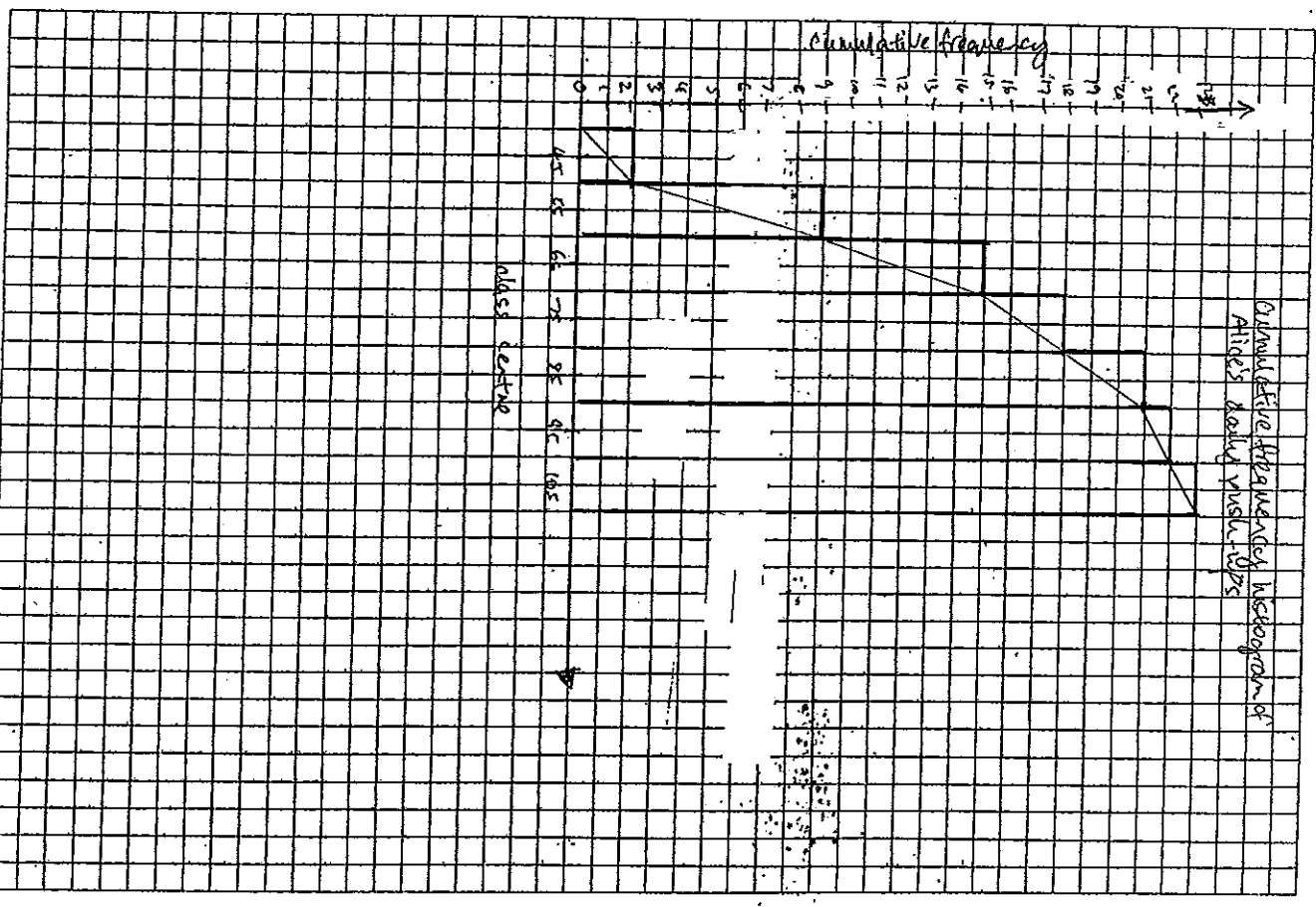
$$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{1444}{23}$$

$\therefore$  Alice did an average of 67 pushups per day

c) On the graph paper supplied construct a cumulative frequency histogram. 2

2

Appendix 6 5 mm grid paper



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

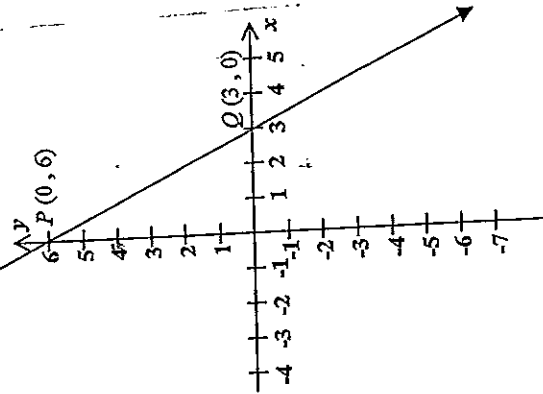
E -1

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)

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

A (1, 4)

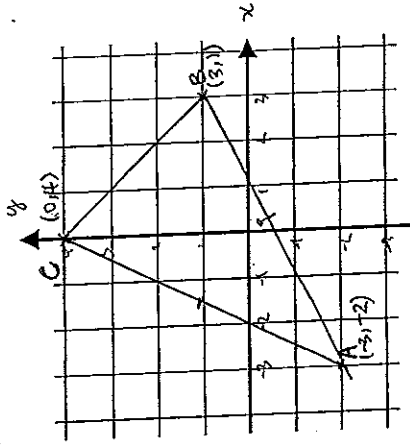
B (2, 2)

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.



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

length of AB

$$d = \sqrt{(-3-3)^2 + (-2-1)^2}$$

$$= \sqrt{6^2 + 3^2}$$

$$= \sqrt{45}$$

$$= 6.7 \text{ units (1 d.p.)}$$

length of AC

$$d = \sqrt{(0-3)^2 + (4-2)^2}$$

$$= \sqrt{3^2 + 2^2}$$

$$= \sqrt{13}$$

$$= 3.6 \text{ units (1 d.p.)}$$

length of BC

$$d = \sqrt{(3-0)^2 + (1-4)^2}$$

$$= \sqrt{3^2 + (-3)^2}$$

$$= \sqrt{9+9}$$

$$= \sqrt{18}$$

$$= 4.2 \text{ units (1 d.p.)}$$

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

the length of

The triangle is isosceles as AB and AC are equal in length. (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.