

St George Girls High School

Year 10

Common Test 3

August 2017



Mathematics

Instructions

1. Write in black pen
2. Show all working
3. Marks may not be awarded for careless or badly arranged work
4. Calculators may be used
5. Diagrams are not drawn to scale

Time Allowed: 75 minutes
Marks: 75

Section	Marks	Total
I -- Statistics		25
II -- Linear Relationship		24
III -- Geometry		13
IV -- Challenging Questions		12
Total		74
		%

Section I -- Statistics

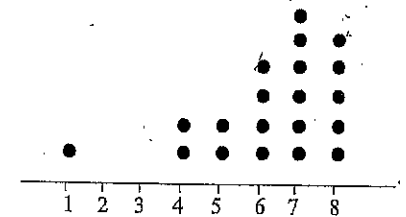
Part A (5 marks) - Multiple Choice

Marks

For Questions 1 - 5 circle the most correct answer.

1. The shape of the statistical distribution in the dot plot can best be described as:

- (A) Bivariate
- (B) Positively Skewed
- (C) Negatively Skewed
- (D) Symmetrical



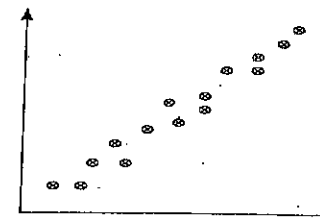
1

2. The interquartile range in this set of data is:

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

- (A) 71.5
- (B) 42
- (C) 17
- (D) 12.5

3. The relationship between the variable x and y in the scatter plot could best be described as:



- (A) No correlation
- (B) A strong positive correlation
- (C) A strong negative correlation
- (D) A weak negative correlation

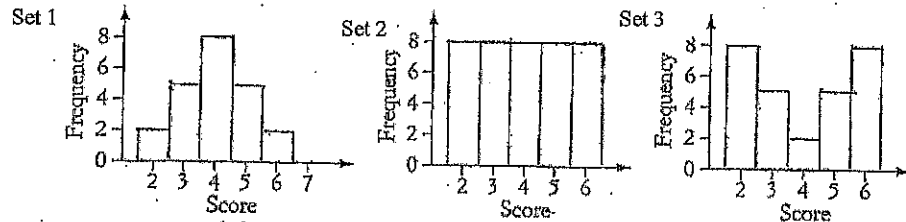
1

Section I Part A continued

Marks

4. For the three sets of statistical distributions shown in the graphs, which one has the greatest standard deviation?

1



- (A) Set 1
(B) Set 2
(C) Set 3
(D) They all have the same standard deviation.

5. X represents the lowest score in the given distribution. Which value of X would be considered an outlier?

X, 49, 53, 53, 57, 62, 62, 65, 66, 68, 70, 74, 75

1

- (A) 32
(B) 30
(C) 28
(D) All of the above

End of Section I Part A

Section I continued

Marks

- Part B (20 marks) – Show all necessary working in the space provided. If there is insufficient space use the space on page 2 clearly indicating the Section, Part and Question Number.

6. These two questions are from a survey to be given to a group of Year 10 students from a Sydney High School.

A What is your height in centimetres?

B How would you rate the current school uniform?

Poor	Below Average	Good	Above Average	Excellent
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Describe the type of data that each of these questions would generate

A _____

2

B _____

2

7. The following scores are the heights in centimetres of thirty Year 9 students. They have been arranged in a Stem and Leaf Plot.

Stem	Leaf
12	3
13	
14	2 3
15	0 1 3 3 3 5 5
16	0 0 1 2 2 2 2 3 4 5 5 7 8 9
17	0 0 1 2 3
18	2

- a) Describe the shape of the distribution

1

Section I Part B Question 7 continued

Mark

b) Are there any outliers? If there are outliers name them.

1

c) Where does clustering occur?

1

d) Find the mode, median and range of this distribution.

3

8. The number of properties sold per month by a real estate agency over a year were:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	5	7	4	5	7	4	6	8	11	6	6

a) Find the five figure summary for this data.

2

b) Draw a Box Plot of this data.

2

Section I Part B continued

Mark

9. The test results for a class of 30 students are as follows:

Boys	78	73	58	79	60	46	71	64	37	79	55	59	87	68	27
Girls	70	39	80	73	61	68	84	60	73	60	54	90	69	63	59

a) Find the mean and standard deviation correct to one decimal place of each group.

4

b) Which group performed better in the test? Give reasons for your answer.

2

END OF SECTION I

Section II – Linear Relationships

Part A (6 marks)– Multiple Choice

Marks

For Questions 1 – 6 circle the most correct answer.

1. The expression $\frac{3}{2x+1} - \frac{4}{3x-7}$ simplifies to:

(A) $\frac{x-20}{(2x+1)(3x-7)}$

(B) $\frac{x-25}{(2x+1)(3x-7)}$

(C) $\frac{x-6}{(2x+1)(3x-7)}$

(D) $\frac{x-11}{(2x+1)(3x-7)}$

1

2. If the point $(a, -2)$ lies on the line $2x + 3y = 4$, the value of a is:

(A) -3

(B) 1

(C) $\frac{3}{2}$

(D) 5

1

3. The midpoint of the interval joining the points $A(-3, -6)$ and $B(4, -9)$ is:

(A) $(1, -15)$

(B) $(\frac{1}{2}, -7\frac{1}{2})$

(C) $(-3\frac{1}{2}, 1\frac{1}{2})$

(D) $(3\frac{1}{2}, -1\frac{1}{2})$

1

Section II Part A continued

Marks

4. The equation of a line parallel to the line $2x + 3y = 4$ is:

(A) $2x + 3y = 5$

(B) $3x + 2y = -1$

(C) $3x - 2y = 7$

(D) $2x - 3y = 4$

1

5. Solve the simultaneous equations:

$$3x - 2y = -5$$

$$2x + 5y = 3$$

(A) $x = -1, y = 1$

(B) $x = 1, y = 1$

(C) $x = -1, y = -1$

(D) $x = 3, y = 7$

1

6. Which of these points is in the region defined by $2x - 3y \geq 4$?

(A) $(1, -1)$

(B) $(3, 2)$

(C) $(-1, 1)$

(D) $(-3, -2)$

1

End of Section II Part A

Section II continued

Mark

Part B (19 marks) – Show all necessary working in the space provided. If there is insufficient space use the space on page 19 or 20 clearly indicating the Section, Part and Question Number.

7. Solve this linear equation:

3

$$\frac{3x + 1}{5} = \frac{3 - 2x}{2}$$

8. Solve the inequality and graph the solution on the number line:

3

$$3x + 7 \leq 2x - 1$$

Section II Part B continued

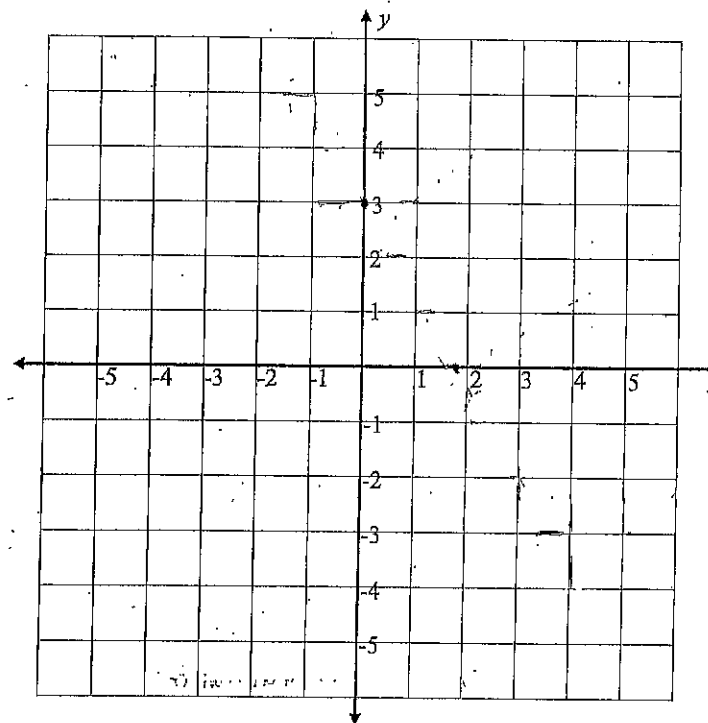
Marks

9. a) Find the gradient and y-intercept of the linear relationship $3y = -5x + 9$:

2

b) Sketch the graph of $3y = -5x + 9$

2



Section II Part B continued

Mark

10. Write the equation of the line passing through the points $A(-2, 5)$ and $B(1, -4)$.

3

11. Write the equation of the line perpendicular to the line $2x - 3y = 8$ and passing through the point $P(2, -1)$.

3

END OF SECTION II

Section II Part B continued

Mark

12. Solve these simultaneous equations using the substitution method:

$$y = 2x - 5$$

$$3x - 2y = 8$$

3

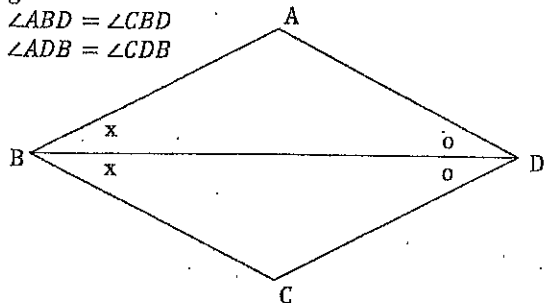
Section III – Geometry

Part A (3 marks)– Multiple Choice

For Questions 1 – 3 circle the most correct answer.

1. The test of congruence that proves $\triangle ABD \cong \triangle CBD$ is:
 given

$\angle ABD = \angle CBD$
 $\angle ADB = \angle CDB$



- (A) RHS
- (B) SAS
- (C) AAS
- (D) SSS

1

2. The interior angle sum of a polygon is 6120° . How many sides does the polygon have?

- (A) 30
- (B) 32
- (C) 34
- (D) 36

1

3. If the size of each exterior angle of a regular polygon is 15° . How many sides does it have?

- (A) 24
- (B) 22
- (C) 20
- (D) 18

1

End of Section III Part A

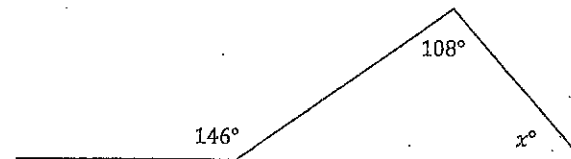
Section III continued

Mark

Part B (10 marks) – Show all necessary working in the space provided. If there is insufficient space use the space on pages 19 or 20 clearly indicating the Section, Part and Question Number.

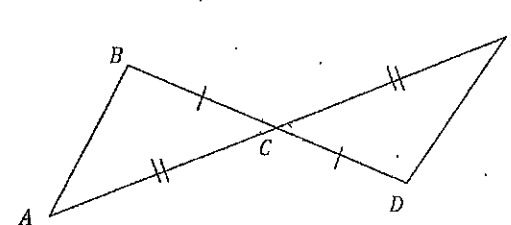
4. Determine the value of x giving a reason:

2



5. Prove this pair of triangles is congruent, giving reasons

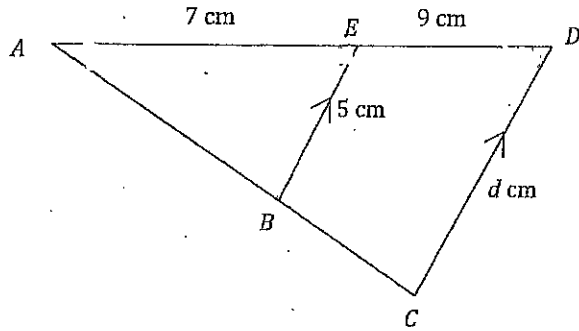
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Section III Part B continued

Marks

6. Prove two triangles in this diagram are similar and find the value of d giving reasons



5.

END OF SECTION III

Section IV – Harder Problems

(12 Marks)

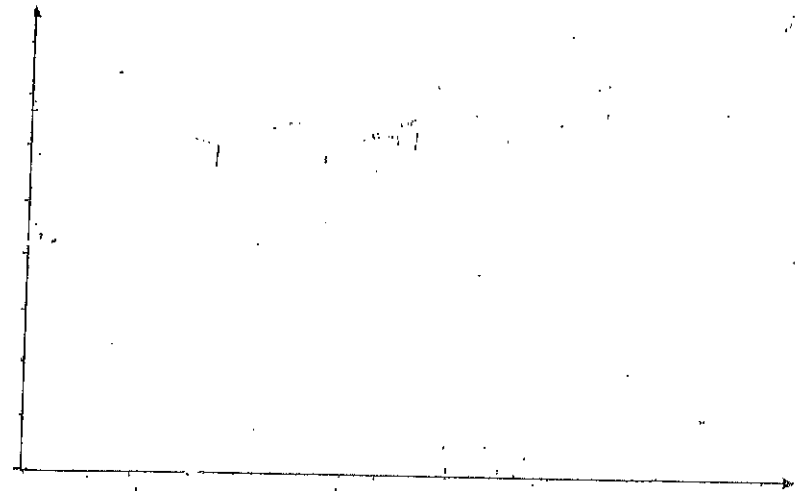
Show all necessary working in the space provided. If there is insufficient space use the space on page 20 clearly indicating the Section, Part and Question Number.

Question 1

The heights and weight of people were measured. Here are the results.

Weight, (W)kg	60	78	82	88	90	94	75	66	58	65
Height, H(cm)	142	168	170	184	180	188	170	158	150	146

- a) Graph the points on a scatter plot.



- b) Construct a line of best fit by eye.

- c) Find the equation of your line of best fit.

Section IV continued

Mark

d) Use the graph to extrapolate the weight of a person with a height of 130cm.

1

e) Use the graph to interpolate the height of a person who weighs 80kg

1

Question 2

Five pies and two sausage rolls cost a total of \$21, while two pies and three sausage rolls cost \$13.90. Find the cost of a pie and the cost of a sausage roll.

5

Section I - Statistics

1. C 2. D 3. B 4. C 5. D

6. A. Continuous Numerical.

B. Discrete Categorical

7. a) Normal distribution

b) Yes, 123 cm

c) At 162 cm

d) Mode: 162 cm

Median: 162 cm

Range: 59 cm

8. a) Minimum: 2

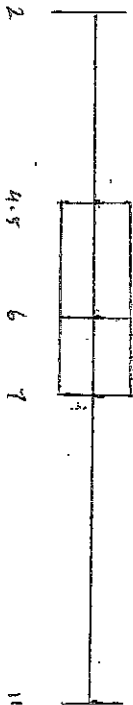
1st Quartile: 4.5

Median: 6

3rd Quartile: 7

Maximum: 11

b)



Boys 62.7 16.1

Girls 66.9 12.2

b) Girls, their mean was higher.

Their std deviation was smaller meaning their score were more consistent with one another.

Section II - Linear Relationships

1. B 2. D 3. B 4. A 5. A 6. A

7.

$$\frac{3x+1}{5} = \frac{3-2x}{2}$$

$$2(3x+1) = 5(3-2x)$$

$$6x+2 = 15-10x$$

$$16x = 13$$

$$x = \frac{13}{16}$$

8.

$$3x+7 \leq 2x-1$$

$$3x-2x \leq -1-7$$

$$x \leq -8$$

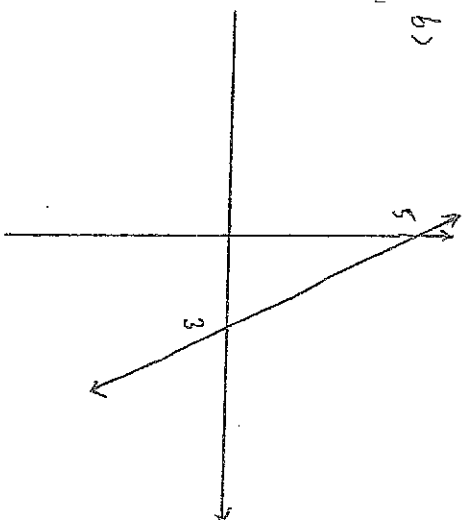


$$y = -\frac{5}{3}x + 3$$

$$\text{Gradient} = -\frac{5}{3}$$

y-intercept is 3.

b)



10.

$$\text{gradient} = \frac{-4-5}{1-(-2)}$$

$$= -3$$

$$y-5 = -3(x+2)$$

$$y-5 = -3x-6$$

$$y = -3x-1$$

11.

$$m = \frac{2}{3}$$

$$mm' = -1$$

$$m' = -1 \times \frac{2}{3} = -\frac{3}{2}$$

$$y+1 = -\frac{3}{2}(x-2)$$

$$2y+2 = -3x+6$$

$$3x+2y-4 = 0$$

$$2x - 2(2x - 5) = 8$$

$$3x - 4x + 10 = 8$$

$$-x = -2$$

$$x = 2$$

Section III - Geometry

1. C 2. D 3. A

4. $x + 108^\circ = 146^\circ$ (exterior \angle equals
sum of 2 opposite
interior \angle s)
 $x = 146 - 108$
 $= 38$

5. $BC = CD$ (given)

$AC = CE$ (given)

$\angle BCE = \angle ECD$ (vertically opposite \angle s)

$\therefore \triangle ABC \cong \triangle CDE$ (SAS)

6. $\angle BAE = \angle CAD$ (common angle)

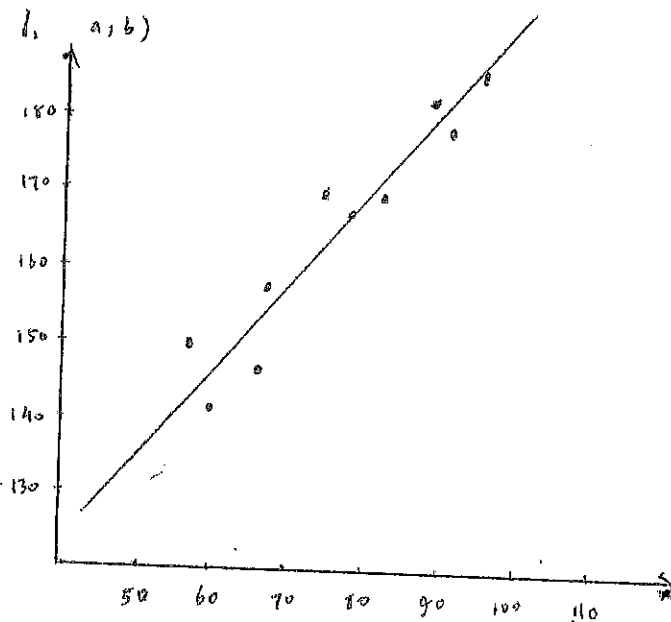
$\angle AEB = \angle ADC$ (corresp \angle s on || lines)

$\therefore \triangle ABE \sim \triangle CAD$ (equiangular)

$\frac{d}{5} = \frac{16}{7}$ (matching sides on

$d = \frac{80}{7}$

similar triangles are
proportional)



c) y-intercept is 133 cm

gradient is $\frac{189 - 133}{94 - 40} = \frac{56}{54} = 1.04$

$y = 1.04x + 133$

d) 45 kg

e) 170 cm

2. $5x + 2y = 21$ — ①

$2x + 3y = 13.9$ — ②

$2.5x + y = 10.5$

$7.5x + 3y = 31.5$ — ③

③ - ②

$5.5x = 17.6$

$x = 3.2$

$2y = 21 - 3.2 \times 5$

$= 5$

$y = 2.5$

Pies cost \$3.20 and sausage rolls
cost \$2.50.