J.M.J.CH

MARCELLIN COLLEGE RANDWICK

YEAR 10

TASK 4 ASSESSMENT

MATHEMATICS 5.2

2015

Weighting: 35% of Assessment Mark.

STUDENT NAME: _____

TEACHER: _____

MARK: / 85

TIME ALLOWED: 75 minutes

Section 1: Statistics /15
Section 2: Area, Surface Area and Volume /20
Section 3: Geometrical Figures /10
Section 4: Similarity /10
Section 5: Trigonometry /16
Section 6: Probability /8
Section 7: MULTIPLE CHOICE /6

DIRECTIONS:
- Answer all questions.
- Show all necessary working where more than one mark is allocated to a question.
- Full marks will not be awarded for answers only.
- Marks may not be awarded for careless or badly arranged work.
- Calculators are allowed and **SHOULD BE USED**

SECTION ONE – Statistics (15 marks)

1. Use the following set of scores the answer the questions below: (4)

4   5   2   6   4   8   4   1   5   4   9   4

a) Range =   b) Median =

c) Mode =   d) Mean =

2. Use the following set of scores to answer the questions below:

11   12   14   15   11   10   16   20   13

a) What is the five-point summary for this data? (1)

b) Use the five-point summary to find the inter-quartile range. (1)

c) Draw a box and whisker plot, labelling all five points clearly. (2)
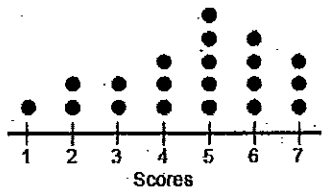
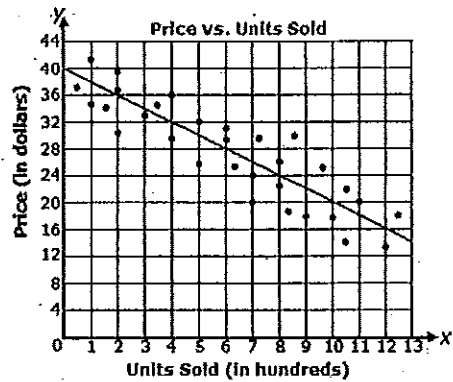3. Describe the skewness of the data represented in the dot plot below. (1)

Scores

4. Calculate the mean ($\bar{x}$) and standard deviation to one decimal place for the following set of data: (2)

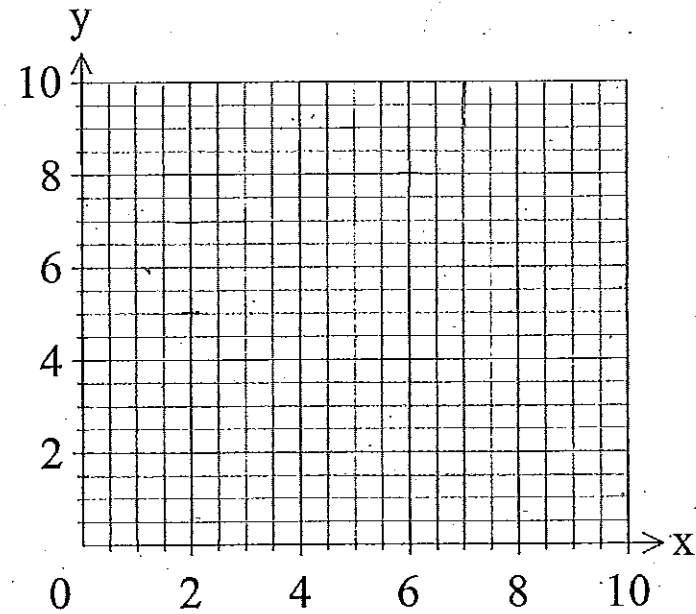23   24   22   20   21   22   28

Mean ($\bar{x}$) =   Standard deviation =

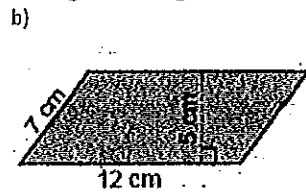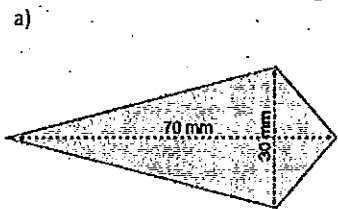5. Use the line of best fit drawn on the scatter plot below to find the equation of the line. (2)

Price vs. Units Sold

Price (in dollars)

Units Sold (in hundreds)

6. Create a scatter plot for the following table of values and then describe the relationship (if any) between the variables. (2)

x	1	2	2	3	4	5	6	7
y	3	5	7	7	9	9	8	10

SECTION TWO – Area, Surface Area and Volume (20 marks)

1. Find the area of the following shapes, showing all working out. (2)

a)

70 mm

30 mm

b)

7 cm

5 cm

12 cm

2. Calculate the surface area of the following prisms, showing all working out. (2)
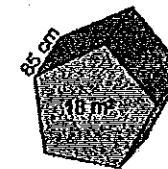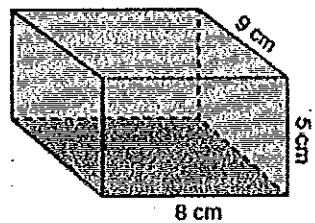
a)

5 cm

Area = 11 cm²

10 cm

b) (2)

8 m

2 m
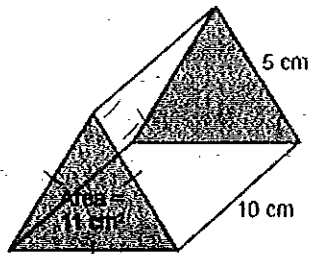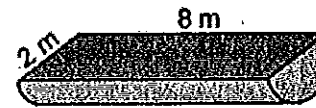
3. A vase is in the shape of a cylinder with no top. It has a diameter of 12cm and a height of 7cm. Calculate the surface area of the vase, correct to the nearest square centimetre. (2)

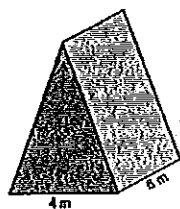4. Calculate the volume of the following 3D shapes, showing all working out. (2)
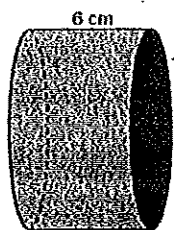
a)

85 cm

18 m²

b) (1)

9 cm
5 cm
8 cm

c) (2)

6 cm

5. The volume of the triangular prism below is 66m³. Calculate the (3)
perpendicular height of the triangular face.

4 m
8 m
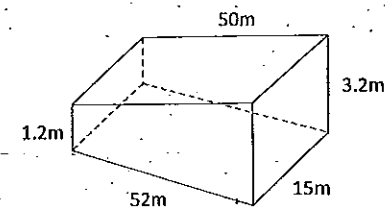
6. A pool is being made in the shape of a trapezoidal prism as shown in the
diagram. Find:
(3)
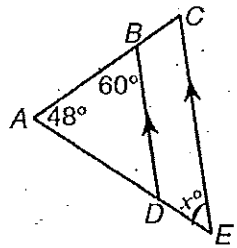a). The surface area of the pool that needs to be tiled.
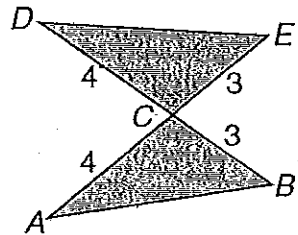

50m
3.2m
1.2m
52m
15m

b) The volume of the pool. (1)
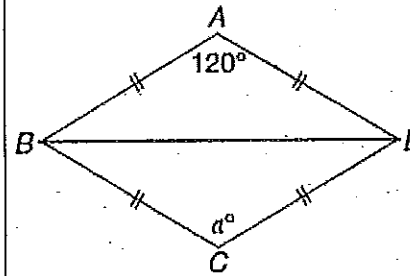
SECTION THREE – Geometrical Figures (10 marks)

1. Find the value of x, giving reasons. (3)

2. Prove that triangle ABC is congruent to triangle DEC, giving reasons. (3)

3. Prove that triangle ABD is congruent to triangle BCD and use this to find the value of a. (4)

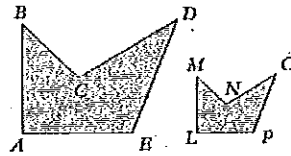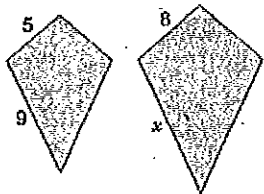## SECTION FOUR – Similarity (10 marks)

1. The following two figures are similar. **(2)**
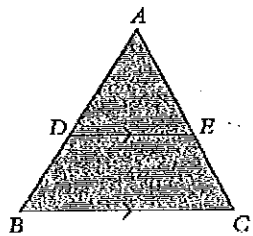
a) What side corresponds to side BC?

b) What angle corresponds to $\angle DEA$?

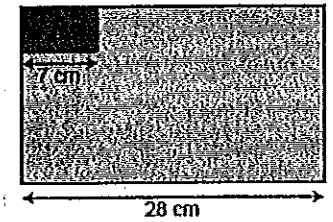**2.** These two kites are similar in shape. First find the enlargement factor and then use this to find the value of x **(2)**

3. Prove that triangle ABC is similar to triangle ADE, giving reasons. **(3)**
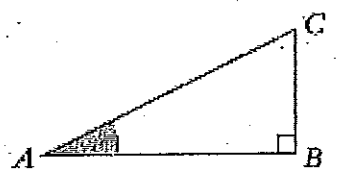
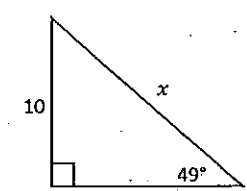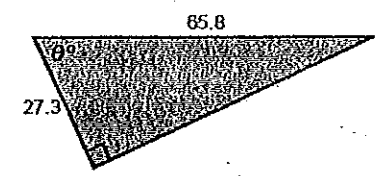**4.** These two rectangles are similar. The area of the smaller rectangle is 35cm². Find:

a) The ratio of the smaller side to the larger side. **(1)**

7 cm

28 cm
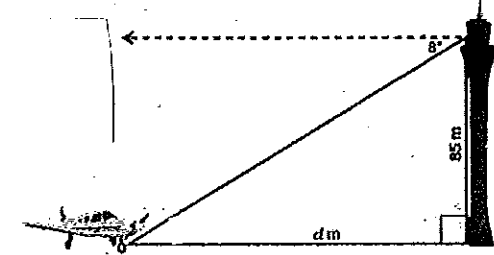
b) The area of the larger rectangle **(2)**

SECTION FIVE – Trigonometry (16 marks)

1. Label the sides of the following triangle according to the angle marked. (3)

Adjacent =

Opposite =

Hypotenuse =

[Triangle with vertices A, B, C; right angle at B, angle marked at A]

2. Convert 51.67° to degrees and minutes (to the nearest minute). (1)

3. Convert 112°32′14″ to two decimal places. (1)

4. Find the value of $\cos 56°23'$ to three decimal places. (1)

5. Find the value of θ if $\sin \theta = 0.216$ (to the nearest degree). (1)

6. Find the value of the pronumeral, showing all working out: (2)

[Right-angled triangle with vertical side 10, angle 49°, hypotenuse x]

7. Find the value of the missing angle, giving your answer to the nearest degree. (2)

[Triangle with sides 65.8 and 27.3, angle θ°]

8. A plane sits at the end of the runway, d metres from the base of an 85m high control tower. The angle of depression from the top of the tower to the plane is 8°. Calculate the length of the runway. (2)

[Diagram showing control tower 85 m high, angle of depression 8°, plane at distance d m]

9. A ship leaves Coffs Harbour and sails 320 km east. It then changes direction and sails 240 km due north to its destination. What will the ship's bearing be from Coffs Harbour when it reaches its destination, correct to two decimal places? *(HINT – Draw a diagram to help you).* **(3)**

SECTION SIX – Probability (8 marks)

1. What is the sample space when rolling a standard die? **(1)**

2. A single card is selected from a standard deck of cards. Calculate, as a fraction in its simplest form, the probability of selecting: **(3)**

   a) A red card

   b) A card that is a 6

   c) A card that is not a 6

3. In a bag there are two blue marbles, 1 red marble and 1 green marble. Two marbles are chosen at random without replacement.
   a) Draw a tree diagram to represent all possible combinations. **(2)**

   b) Use your tree diagram to calculate the probability of choosing:
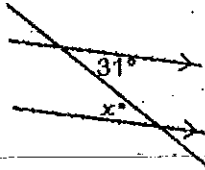   i. A blue marble and then a red marble **(1)**

      ii. Two marbles of a different colour **(1)**

SECTION SEVEN – Multiple Choice

Select ONE answer per question and circle your response. Each question is worth one mark.

1. From the diagram below, what is the value of x?

   A. 31°   B. 149°   C. 62°   D. 15.5°

2. If two adjacent angles add up to 90° what type of angles are they?

   A. Congruent   B. Supplementary   C. Co-interior   D. Complementary

3. A standard die is rolled. What is the probability of rolling a multiple of three, expressed as a fraction in its simplest form?

   A. $\dfrac{2}{6}$ B. $\dfrac{1}{2}$ C. $\dfrac{1}{3}$ D. $\dfrac{1}{6}$

4. A coin is tossed six times in a row. What is the probability, as a fraction, of getting six tails in a row?

   A. $\dfrac{1}{6}$ B. $\dfrac{1}{64}$ C. $\dfrac{1}{2}$ D. $\dfrac{3}{1}$

5. The mean of three scores is 21. If a fourth score of 31 is added what is the new mean?

   A. 23.5   B. 23   C. 24.5   D. 26

6. The volume of a cube is 614.125 cm³. What is the length of one side?

   A. 8.5 cm   B. 204.7 cm²   C. 102 cm²   D. 11.4 cm

END OF EXAM

SECTION ONE – Statistics (15 marks)

1. Use the following set of scores the answer the questions below: **(4)**

$$4 \quad 5 \quad 2 \quad 6 \quad 4 \quad 8 \quad 4 \quad 1 \quad 5 \quad 4 \quad 9 \quad 4$$

1 2 4 4 4 4 4 5 5 6 8 9

9 - 1 =

a) Range = 8 ✓

b) Median = 4 ✓

c) Mode = 4 ✓

d) Mean = 4.6 ✓

2. Use the following set of scores to answer the questions below:

$$11 \quad 12 \quad 14 \quad 15 \quad 11 \quad 10 \quad 16 \quad 20 \quad 13$$

10 11 11 12 13 14 15 16 20

a) What is the five-point summary for this data? **(1)**

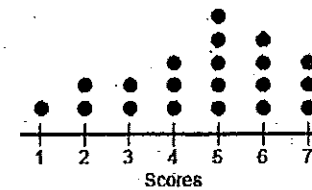min = 10 Q_1 = 11 Q_2 = 13 Q_3 = 15.5   Max = 20 ✓

b) Use the five-point summary to find the inter-quartile range. **(1)**

$IQR = Q_1 - Q_3$

$IQR = 4.5$ ✓

c) Draw a box and whisker plot, labelling all five points clearly. **(2)**

✓

min   Q1   Q2   Q3   max

10 11 12 13 14 15 16 17 18 19 20

⑧
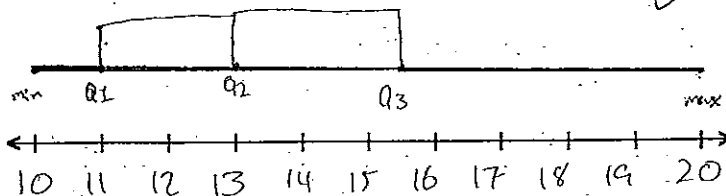
3. Describe the skewness of the data represented in the dot plot below. **(1)**
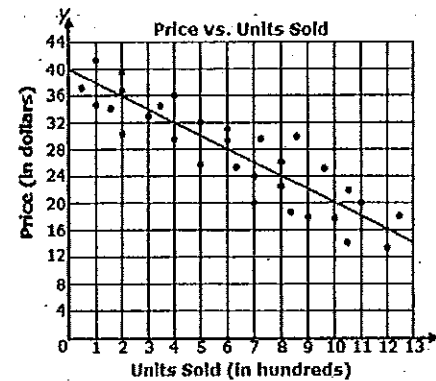
Negatively skewed ✓

Scores

4. Calculate the mean ($\bar{x}$) and standard deviation to one decimal place for the following set of data: **(2)**

$$23 \quad 24 \quad 22 \quad 20 \quad 21 \quad 22 \quad 28$$

Mean ($\bar{x}$) = 22.9 ✓   Standard deviation = 2.4 ✓

5. Use the line of best fit drawn on the scatter plot below to find the equation of the line. **(2)**

Price vs. Units Sold
Price (in dollars)
Units Sold (in hundreds)

Gradient $= \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{40 - 24}{0 - 8}$

$= \dfrac{16}{-8} = -2$

$y = mx + b$

$y = -2(x) + b$

Sub in any co-ordinate to find 'b' (ie 0,40)

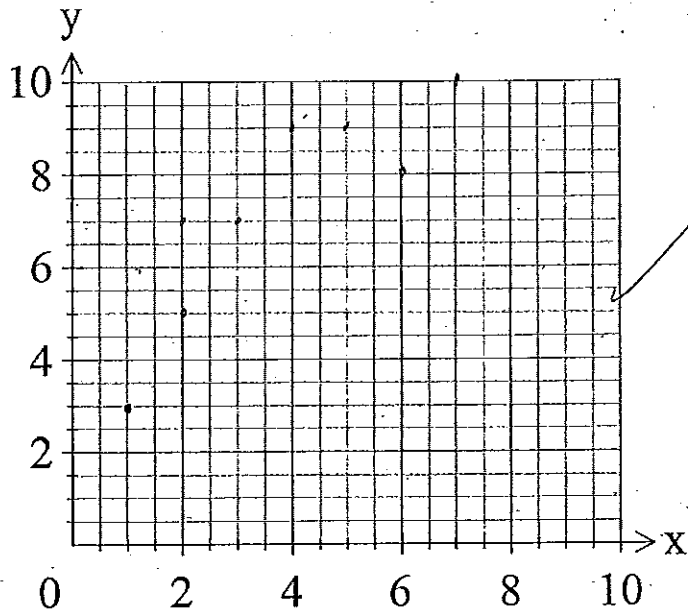$40 = 0 + b \Rightarrow b = 40$

ie equation of line is $y = -2x + 40$

④

6. Create a scatter plot for the following table of values and then describe the relationship (if any) between the variables. *(2)*

x	1	2	2	3	4	5	6	7
y	3	5	7	7	9	9	8	10

A positive relationship. ✓
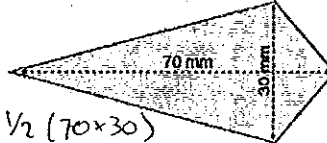
A of square = s
A of rectangle = lb
A of trapezium = ½ h(a+b)
A of parallelogram = bh
A of rhombus = ½ xy
A of circle = πr^2
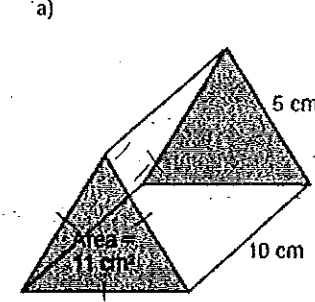$2\pi rh + 2\pi r^2$
Sum of interior ∠'s = $(n-2) \times 180$
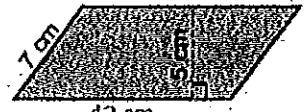
SECTION TWO – Area, Surface Area and Volume (20 marks)

1. Find the area of the following shapes, showing all working out. *(2)*

a)

70 mm
30 mm

½ (70×30)

= 1050 mm² ✓

b)

7 cm
12 cm

A of parallelogram = bh

b = 12 cm

h = 5 cm

A = 60 cm² ✓

2. Calculate the surface area of the following prisms, showing all working out. *(2)*

a)

5 cm
Area = 11 cm²
10 cm

$(5 \times 10) \times 3 = 150$

$150 + 11 \times 2$

$= 172 \, cm^2$ ✓

②

④

b) (2)

8 m, 2 m
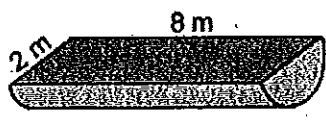
$SA = (8 \times 2) + \pi r^2 + \pi rh.$

when $h = 8m$ and $r = \frac{2}{2} = 1m$

$= 16 + \pi + 8\pi$

$= 16 + 9\pi$

$\approx 44.27 m^2$

---

3. A vase is in the shape of a cylinder with no top. It has a diameter of 12cm and a height of 7cm. Calculate the surface area of the vase, correct to the nearest square centimetre. (2)

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

$2\pi \times 6 \times 7 + \pi \times 6^2$

$= 264 \text{ (nearest cm)} + 113 \text{ (nearest cm)}$

$= 377 cm^2 \text{ (nearest cm}^2)$ ✓

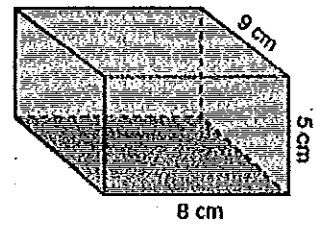4. Calculate the volume of the following 3D shapes, showing all working out.

a) (2)

$V = Ah$

$V = 18 \times .85$

$V = 15.3 m^3$ ✓
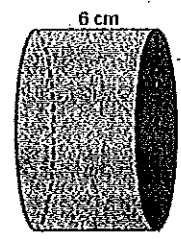

85 cm, 18m²

---

b) (1)

9 cm, 8 cm, 5 cm

$V = AL$

$V = (\underset{5 \times 8}{lb}) \times 9$
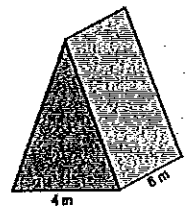
$V = 360 cm^3$ ✓

---

c) (2)

6 cm

$V = Ah$

$V = (\pi \times 5^2) \times 6$

$V = 471.2 cm^3$ ✓

---

5. The volume of the triangular prism below is 66m³. Calculate the perpendicular height of the triangular face. (3)

6 m, 4 m

$\frac{66}{6} = (\frac{1}{2} bh) \times \frac{6}{6}$
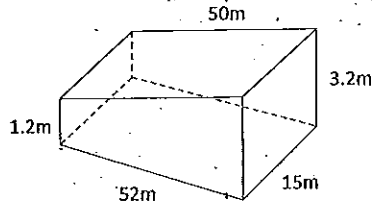
$11 = \frac{1}{2} \times 4 \times h$

$\frac{11}{2} = \frac{2h}{2}$

$h = 5.5 m$ ✓

A of trapezoid = ½ h(a+b)

6. A pool is being made in the shape of a trapezoidal prism as shown in the diagram. Find: **(3)**
   a). The surface area of the pool that needs to be tiled.

50m
3.2m
1.2m
52m
15m

Tiled Area.
= $(15 \times 1.2) + (15 \times 3.2)$
$+ 2(50 \times 1.2) + (2 \times 50)$
$+ (15 \times 52)$

= $1066 m^2$

(1)

b) The volume of the pool.
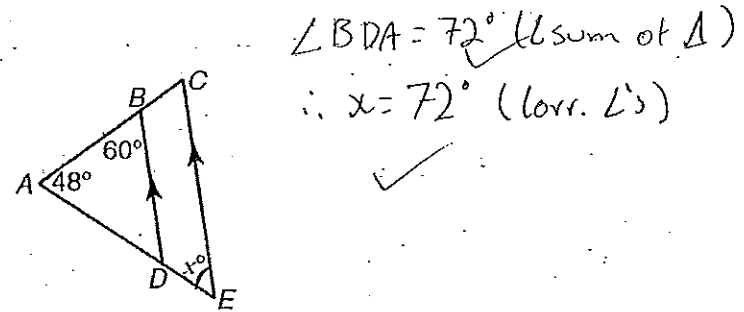$V = Ah$
$V = (½ \times 52)(1.2+3.2) \times 15$
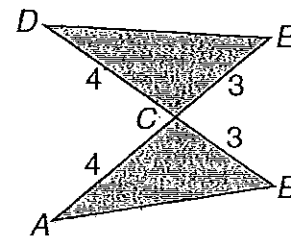$V = 114.4 \times 15$
$V = 1716 m^3$ ect

③

1. Find the value of x, giving reasons. **(3)**

B C
60°
A 48°
D x° E

$\angle BDA = 72°$ (∠ sum of Δ)
∴ $x = 72°$ (corr. ∠'s)
✓

3.

2. Prove that triangle ABC is congruent to triangle DEC, giving reasons. **(3)**

D E
4   3
C
4   3
A   B

$DC = AC$ (given)
$EC = BC$ (given) ✓
$\angle DCE = \angle ACB$ (vert. ∠'s)
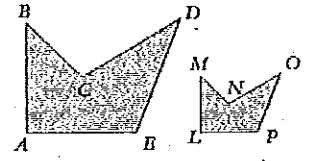∴ $\triangle ABC \equiv DEC$ (SAS) ✓

3

/6

3. Prove that triangle ABD is congruent to triangle BCD and use this to find the (4)
value of a.
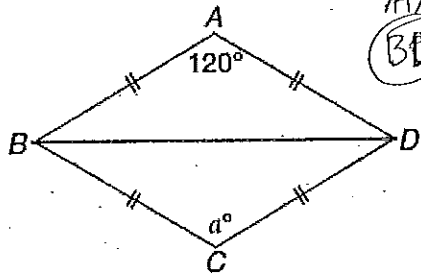
$AB = BC$ (given) ✓

$AD = DC$ (given) ✓

(BD) is common

$\therefore \triangle ABD \equiv \triangle BCD$ (SSS)

$\therefore a° = 120°$ (matching ∠'s) ✓

of congruent
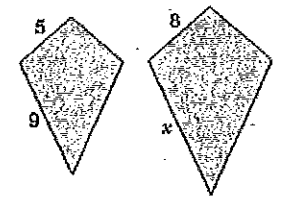
∆'s)

1. The following two figures are similar. (2)
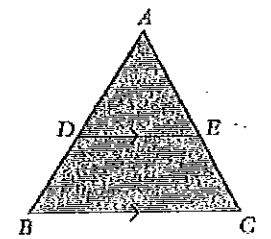

a) What side corresponds to side BC?

MN ✓

b) What angle corresponds to ∠DEA?

∠OPL ✓

2. These two kites are similar in shape. First find the enlargement factor and (2)
then use this to find the value of x.

enlargement factor = 1.6 ✓

$x = 14.4$ ✓

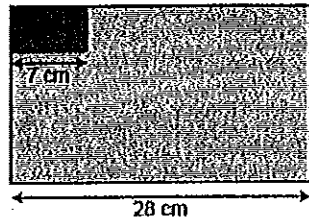3. Prove that triangle ABC is similar to triangle ADE, giving reasons. (3)

∠BAC = ∠DAE (common) ✓

∠ADE = ∠ABC (corr. ∠'s)

∠AED = ∠ACB (corr. ∠'s) ✓

$\therefore \triangle ABC \; ||| \; \triangle ADE$ (matching angles are equal) ✓

2

2

3

(7

4. These two rectangles are similar. The area of the smaller rectangle is 35cm². Find:

a) The ratio of the smaller side to the larger side. **(1)**

$1:4$ or $\frac{1}{4}$ ✓

7 cm

28 cm

b) The area of the larger rectangle **(2)**

height of smaller rectangle =
$$\frac{35cm^2}{7cm} = 5cm.$$

height of Larger rectangle =
5×4 (from part a) $= 20cm.$

∴ Area of Larger rectangle =
$28 \times 20 = 560 cm^2$

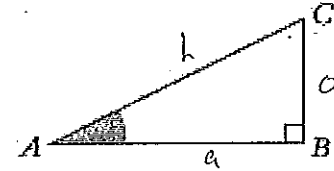1. Label the sides of the following triangle according to the angle marked. **(3)**

Adjacent = AB ✓ 1

Opposite = CB 1

Hypotenuse = AC 1

C

h

O

A

a

B

2. Convert 51.67° to degrees and minutes (to the nearest minute). **(1)**

$51° 40'$

1

3. Convert 112°32'14" to two decimal places. **(1)**

112.54 (2 dp.)

1
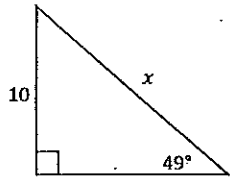
4. Find the value of cos 56°23' to three decimal places. **(1)**

0.554 (3 dp.)

1

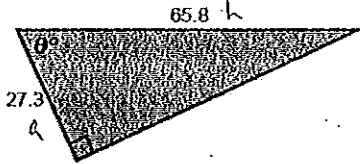5. Find the value of θ if sin θ = 0.216 (to the nearest degree). **(1)**

$\theta = 12°$

∅ 1

/1

7

6. Find the value of the pronumeral, showing all working out: (2)

SINE RULE

$$\frac{10}{\sin 49} = \frac{x}{\sin 90} \quad \text{OR} \quad \frac{10}{x} = \sin 49$$
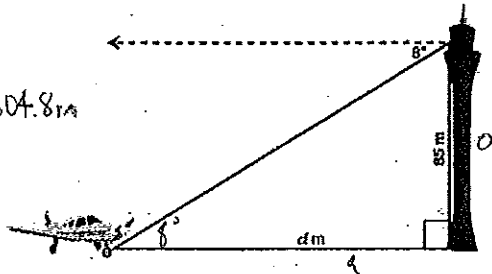
using Trig Relations

$$x = 13.25$$

7. Find the value of the missing angle, giving your answer to the nearest degree. (2)


$$\cos \theta = \frac{27.3}{65.8}$$

$$\theta = \cos^{-1}\left(\frac{27.3}{65.8}\right)$$

$$\theta = 65° \text{ (nearest degree)}$$

2

8. A plane sits at the end of the runway, *d* metres from the base of an 85m high control tower. The angle of depression from the top of the tower to the plane is 8°. Calculate the length of the runway. (2)

$$\frac{85m}{\tan(8)} = d$$

$$d = 604.8m$$

9. A ship leaves Coffs Harbour and sails 320 km east. It then changes direction and sails 240 km due north to its destination. What will the ship's bearing be from Coffs Harbour when it reaches its destination, correct to two decimal places? *(HINT – Draw a diagram to help you).* (3)

Ships bearing FROM Coffs Harbour (let this be 'y')
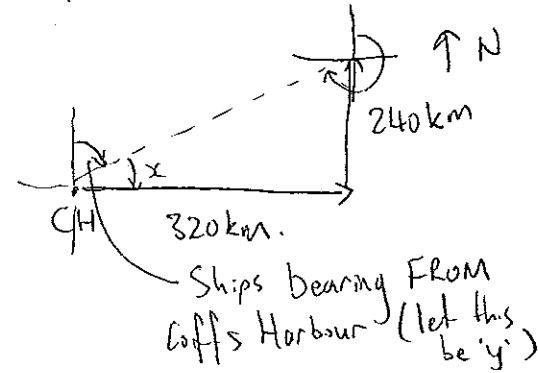
$$x = \tan^{-1}\left(\frac{240}{320}\right) = 36°52'$$

$$x + y = 90°$$

$$y = 90° - x = 53°8'$$

3

2

SECTION SIX – Probability (8 marks)

1. What is the sample space when rolling a standard die? *(1)*

$$\{1, 2, 3, 4, 5, 6\}$$

2. A single card is selected from a standard deck of cards. Calculate, as a fraction in its simplest form, the probability of selecting: *(3)*

a) A red card $\dfrac{26}{52} = \dfrac{1}{2}$ ✓

b) A card that is a 6 $4/52 = 1/13$ ✓

c) A card that is not a 6 $48/52 = 12/13$ ✓

3. In a bag there are two blue marbles, 1 red marble and 1 green marble. Two marbles are chosen at random without replacement.

a) Draw a tree diagram to represent all possible combinations. *(2)*

Blue ¼ Red ¼ Green ¼

R ½ 6 ½ B ½ 6 ½ B ½ R ½

6   R   6   B   R   B

2

b) Use your tree diagram to calculate the probability of choosing:

i. A blue marble and then a red marble *(1)*

$\frac{2}{4} \times \frac{1}{3} = \frac{2}{12} = \frac{1}{6}$

ii. Two marbles of a different colour *(1)*

$1 - \left(\frac{2}{4} \times \frac{1}{3}\right) = \frac{5}{6}$

SECTION SEVEN – Multiple Choice

Select ONE answer per question and circle your response. Each question is worth one mark.

1. From the diagram below, what is the value of x?

31°
x°

(A) 31° (Alt ∠S)   B. 149°   C. 62°   D. 15.5°

2. If two adjacent angles add up to 90° what type of angles are they?

A. Congruent   B. Supplementary   C. Co-interior   (D.) Complementary

3. A standard die is rolled. What is the probability of rolling a multiple of three, expressed as a fraction in its simplest form?

A. $\frac{2}{6}$ B. $\frac{1}{2}$ (C) $\frac{1}{3}$ ✓   D. $\frac{1}{6}$

4. A coin is tossed six times in a row. What is the probability, as a fraction, of getting six tails in a row?

A. $\frac{1}{6}$ (B.) $\frac{1}{64}$ C. $\frac{1}{2}$ D. $\frac{3}{1}$

5. The mean of three scores is 21. If a fourth score of 31 is added what is the new mean?

(A) 23.5   B. 23   C. 24.5   D. 26

6. The volume of a cube is 614.125 cm³. What is the length of one side?

(A) 8.5 cm   B. 204.7 cm²   C. 102 cm²   D. 11.4 cm

END OF EXAM

4