NAME	MARK
MEMO.	
TEACHER	
CLASS	PERCENTAGE

HERZLIA MIDDLE SCHOOL

GRADE 9

MATHEMATICS EXAMINATION

PAPER 2

18 November 2016

TIME: 75 Minutes

MARKS: 80

This paper consists of 16 pages

- All working details must be shown clearly.
- Marks will be deducted if work is set out incorrectly.
- Please note that diagrams are not necessarily drawn to scale.
- Calculators may be used.
- Unless convention or instructions dictate otherwise, round answers to two decimal places.
- It is in your own interest to write legibly and to present your work neatly.

Question 1

Circle the correct answer from each of the four possible answers:

1.1 The diagonals of a ..... are equal (1)

A Rhombus

(B) Rectangle

C Trapezium

D Parallelogram

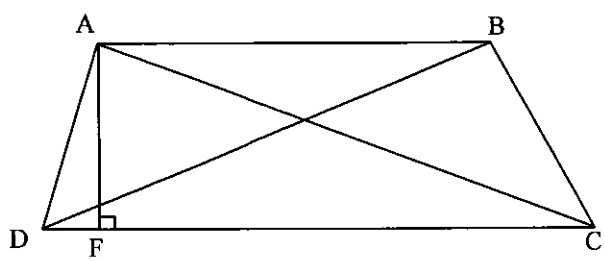
1.2 ABCD is a trapezium with AB || DC and AF ⊥ DC.
The area of the trapezium can be calculated by: (1)

A $AF \times DC$

B $\frac{1}{2}DC \times (AD+BC)$

C $AC \times DB$

(D) $\frac{1}{2}(AB+DC) \times AF$



1.3 If the perimeter of a square is 64 cm, its area is: (1)

A $64\ cm^2$

(B) $256\ cm^2$

C $32\ cm^2$

D $16\ cm^2$

1.4 Which of the following three lengths will make a right angled triangle?
(i.e is a Pythagorean Triple.) (1)

A 5 cm : 1 cm : 2 cm

B 49 cm: 16 cm : 9 cm

C 2 cm: 1 cm: 1 cm

(D) 13 cm : 12 cm : 5 cm

1.5 If one interior angle of a triangle is equal to the sum of the other two interior angles, then the triangle is: (1)

A Equilateral

B Obtuse-angled

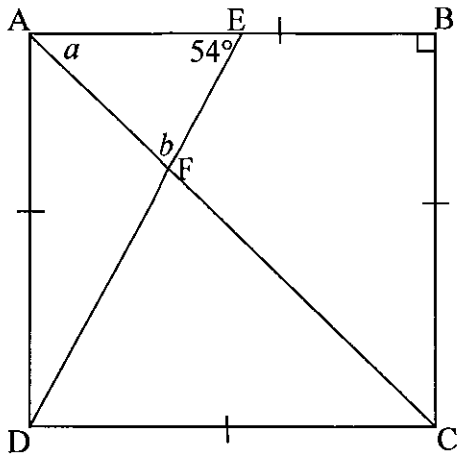
(C) Right-angled

D Acute-angled

(5)

Question 2

2.1



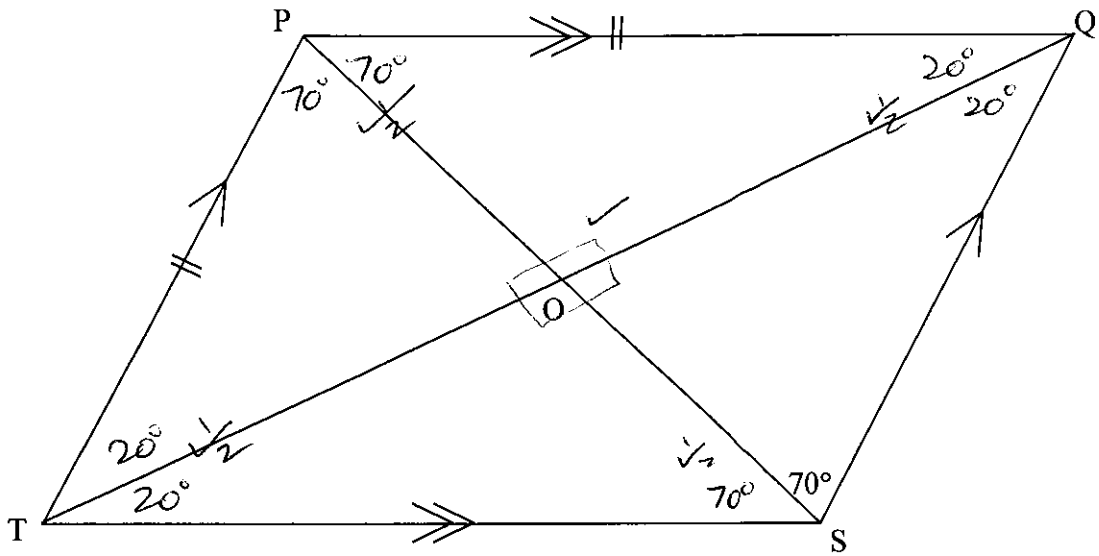
2.1.1 Classify quadrilateral ABCD. (1)

Square ✓

2.1.2 Write down the values of a and b. No reasons need to be given. (2)

$a = 45°$ ✓
$b = 81°$ ✓

2.2. Quadrilateral PQST, is not drawn to scale.



2.2.1 Classify the quadrilateral. (1)

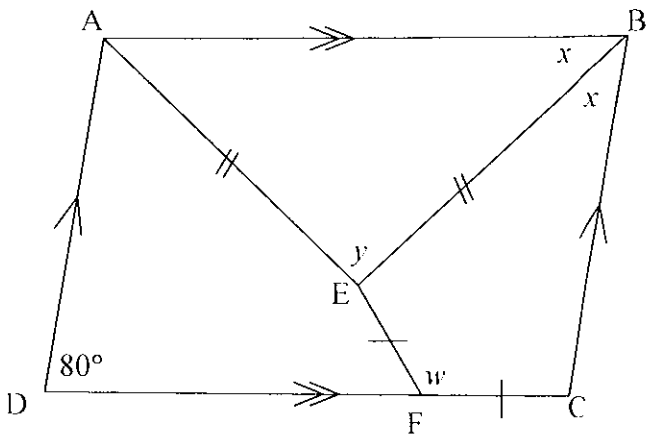
rhombus

2.2.2 Fill in all the missing angles. (3)

4

Question 3

In the diagram, AE = EB and EF = FC.



3.1 Find the value of x. Give a reason. (2)

$x = 40°$ (opp $\angle$s ||gram ABCD)

3.2 Find the value of y. Give reasons. (2)

$y = 100°$ ($\angle$ sum isosc $\triangle$ AEB)

3.3 Find the values of w. Give reasons. (4)

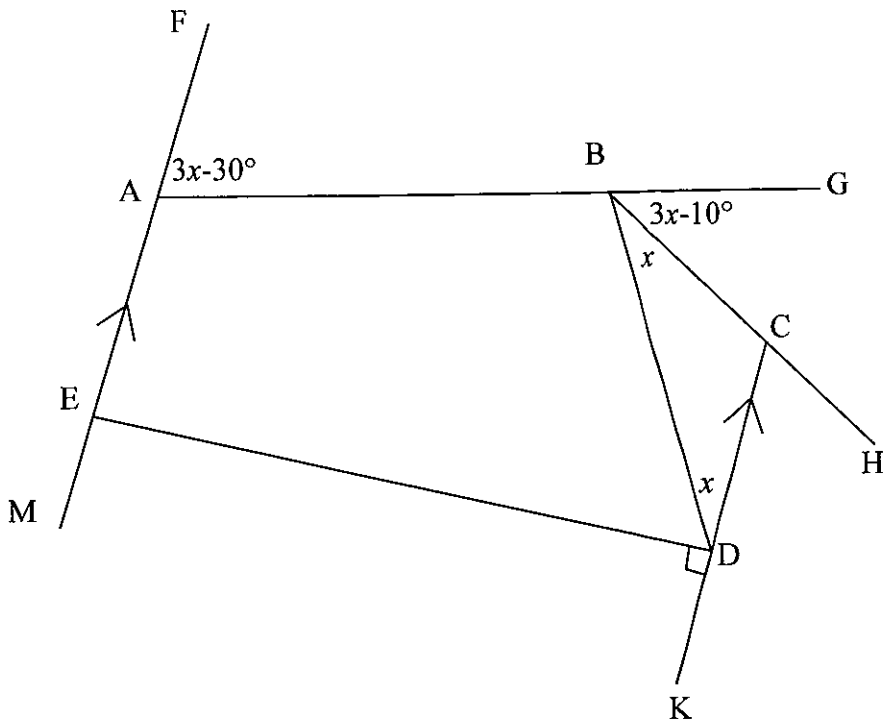
$B\hat{C}F = 100°$ (coint $\angle$s AB || CD) OR
coint $\angle$s AD || CB

$B\hat{E}F = 100°$ (opp $\angle$s kite BEFC =)

$w = 120°$ ($\angle$ sum kite $\triangle$EFC)

8

Question 4



4.1 Complete: The sum of the exterior angles of a polygon is ..360.. degrees. (1)

4.2 Write down the size of MÊD. Give a reason. (2)

$M\hat{E}D = 90^\circ$ (coint $\angle$'s MF // KC)

4.3 Write down the value of DĈH in terms of x. Give a reason (2)

$D\hat{C}H = 2x$ (ext $\angle$ of $\triangle$ BCD)

4.3 Hence find the size of x. (3)

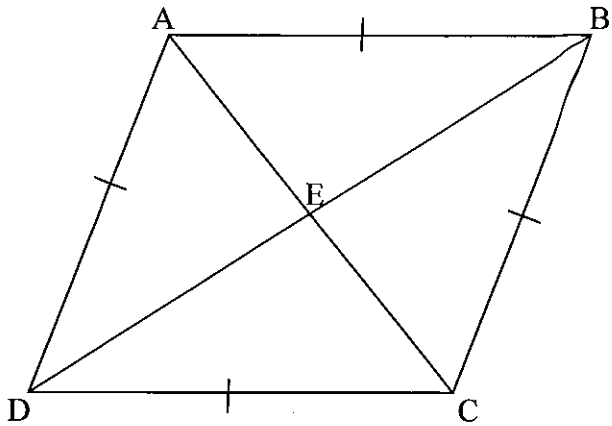
$3x - 30^\circ + 3x^\circ - 10^\circ + 2x + 180^\circ = 360^\circ$ (Sum ext $\angle$'s polygon)

$8x = 220^\circ$

$x = 27\frac{1}{2}^\circ$

8

Question 5



5.1 What is the size of $A\hat{E}B$. (1)

90°

5.2 If DB is 16 cm and AC is 12 cm, calculate the perimeter of ABCD. No reasons need to be given. (3)

$AB = \sqrt{6^2 + 8^2}$ ✓

$= 10\text{cm}$ ✓

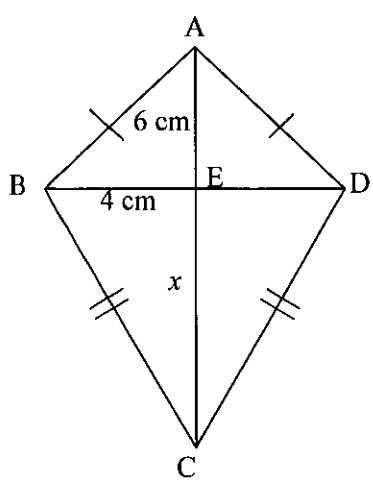
$P = 4 \times 10 = 40\text{cm}$ ✓

Question 6

The area of the kite shown is 64 cm^2. (2)

The length of AE is 6 cm and BE is 4 cm.

Find the length of EC, marked x in the diagram.



$\frac{8 \times (6+x)}{2} = 64$ ✓

$6 + x = 16$

$x = 10\text{cm}$ ✓

6

Question 7

The following statements are incorrect. Rewrite them so that they are correct. The part you have to rewrite is underlined.

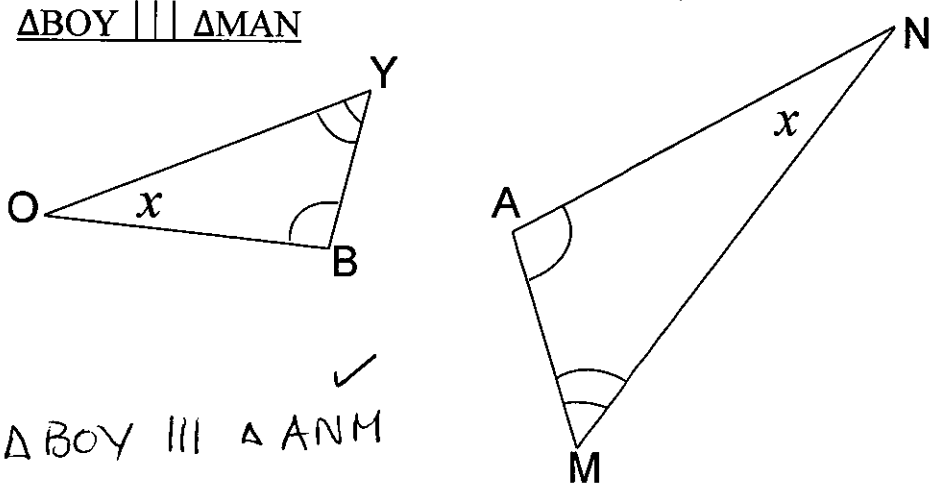
7.1 Consider the triangles below: <u>ΔABC ≡ ΔPQR (SAS)</u> (1)

ΔABC ≡ ΔPQR (RHS) ✓

7.2 The four reasons for congruency are: <u>AAcorrespS, SAS, RHS, AAA</u> (1)

AAS, SAS, RHS, SSS ✓

7.3 Consider the two similar triangles below. The correct way to name them is as follows: <u>ΔBOY ||| ΔMAN</u> (1)



✓

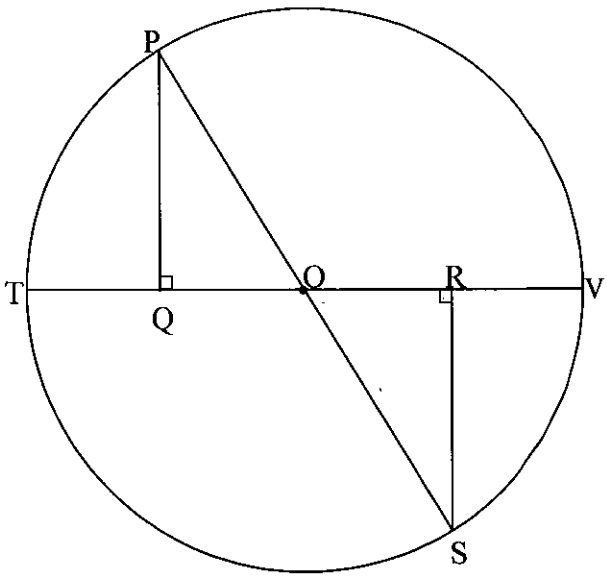
ΔBOY ||| ΔANM

7.4 The transformation rule $(x\ ;\ y) \rightarrow (y\ ;\ x)$ is: <u>reflection over the y-axis</u> (1)

reflection in $y = x$ ✓

4

Question 8



8.1 Prove that ΔPQO ≡ ΔSRO. (5)

In ΔPQO and ΔSRO

1. $P\hat{O}Q = R\hat{O}S$ (vert. opp ∠'s) ✓
2. $PO = OS$ ✓ (radii) ✓
3. $P\hat{Q}O = 90° = O\hat{R}S$ (given) ✓

$\therefore \Delta PQO \equiv \Delta SRO$ (AAS) ✓

8.2 Hence show that RV = TQ. (3)

$TO = OV$ (radii) ✓

$QO = OR$ ($\equiv \Delta$'s) ✓

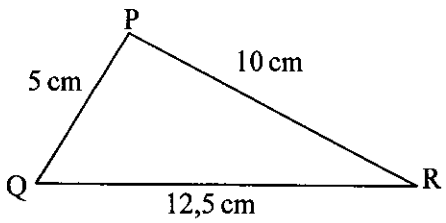
$TO - QO = OV - RO$ ✓

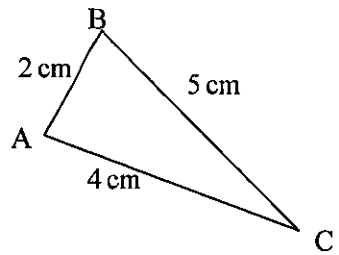
$\therefore TO = RV$ ✓

8

Question 9

9.1 Are ΔQRS and ΔACB similar to each other? Show your working. (4)





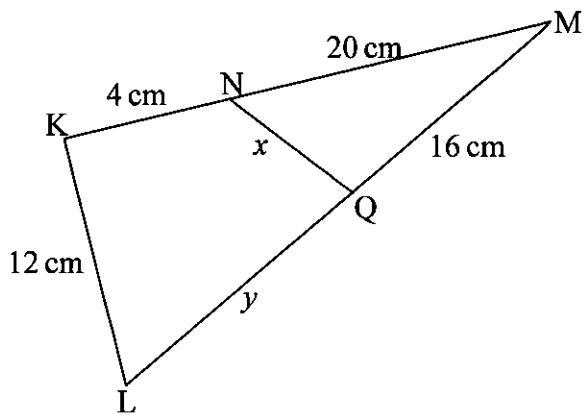
$\frac{PQ}{AB} = \frac{5}{2} = 2\frac{1}{2}$ ✓

$\frac{QR}{BC} = \frac{12\frac{1}{2}}{5} = 2\frac{1}{2}$ ✓

$\frac{PR}{AC} = \frac{10}{4} = 2\frac{1}{2}$ ✓

Δ's are similar ✓ as the sides are in the same proportion ✓

9.2



In the diagram ΔKLM ||| ΔQNM. (4)
Calculate the lengths of the line segments marked *x* and *y*

$\frac{KL}{QN} = \frac{LM}{NM} = \frac{KM}{QM}$ ✓ (III Δ's) ✓

$\frac{12}{x} = \frac{y+16}{20} = \frac{24}{16}$ ✓

$24x = 192$ ✓

$\therefore x = 8\text{ cm}$ ✓

$8(y+16) = 240$ ✓

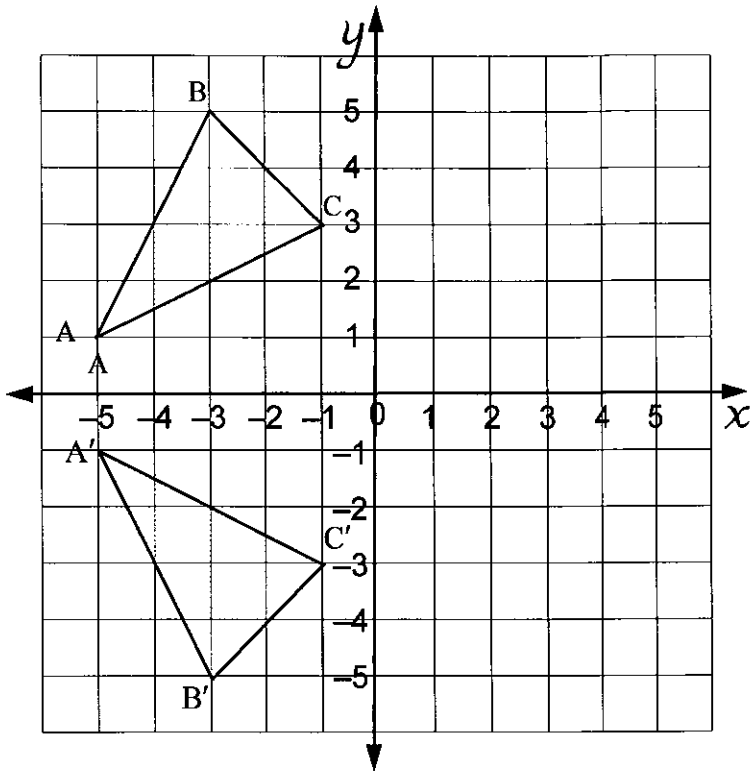
$y+16 = 30$

$y = 14\text{ cm}$ ✓

8

Question 10

10.1 Consider the diagram below:



10.1.1 Write down the coordinates of point B. (1)

$(-3; 5)$ ✓

10.1.2 Describe the transformation from ΔABC to ΔA'B'C' (in words). (1)

reflection in x-axis ✓

10.1.3 Choose the correct statement below (just write down the letter): (1)

✓

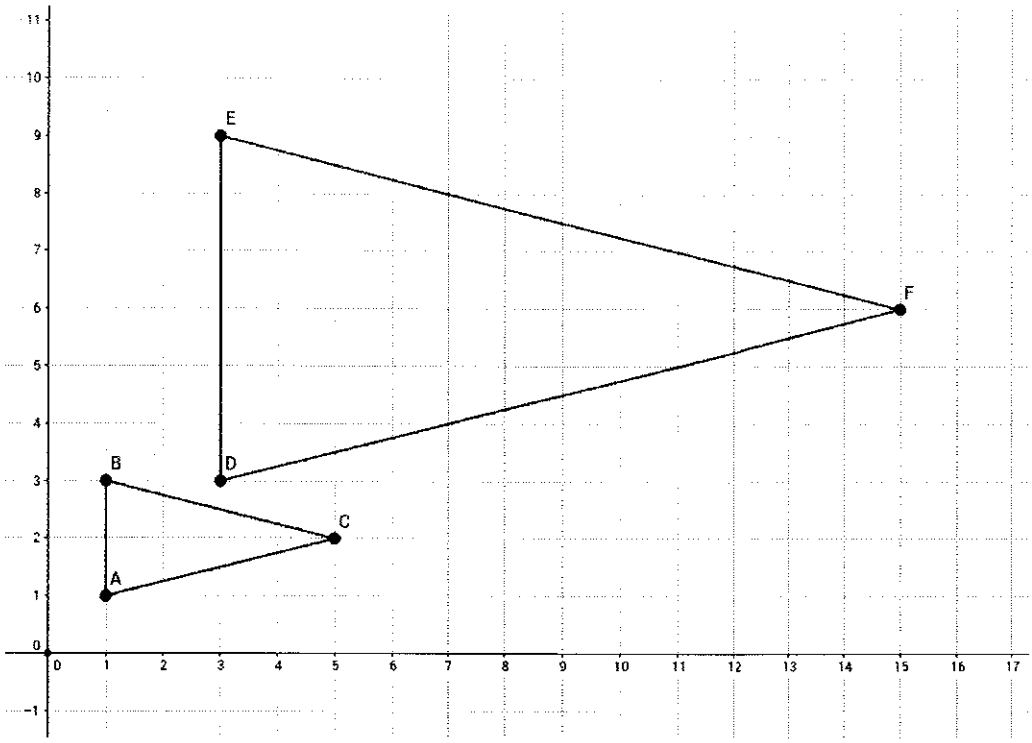
A: ΔABC : ΔA'B'C' = 1 : 2 **B**: ΔABC ≡ ΔA'B'C' **C**: ΔABC // ΔA'B'C'

10.1.4 If ΔABC is translated by the rule $(x; y) \rightarrow (x + 1; y - 3)$ give the coordinates of the image of point C. (1)

$(0; 0)$ ✓

4

10.2 Consider the diagram below:



10.2.1 Choose the correct word:

ΔABC is an enlargement / reduction of ΔDEF. (1)

10.2.2 Give the scale factor of the change in dimensions of ΔABC to ΔDEF. (1)

1 : 3

10.2.3 Choose the correct statement: (1)

A: ΔABC is similar to ΔDEF

B: ΔABC is congruent to ΔDEF

C: ΔABC is neither similar nor congruent to ΔDEF

10.2.4 Determine the scale factor of the area of ΔABC to ΔDEF. (3)

Area $\Delta ABC = \frac{2 \times 4}{2} = 4 cm^2$ ✓

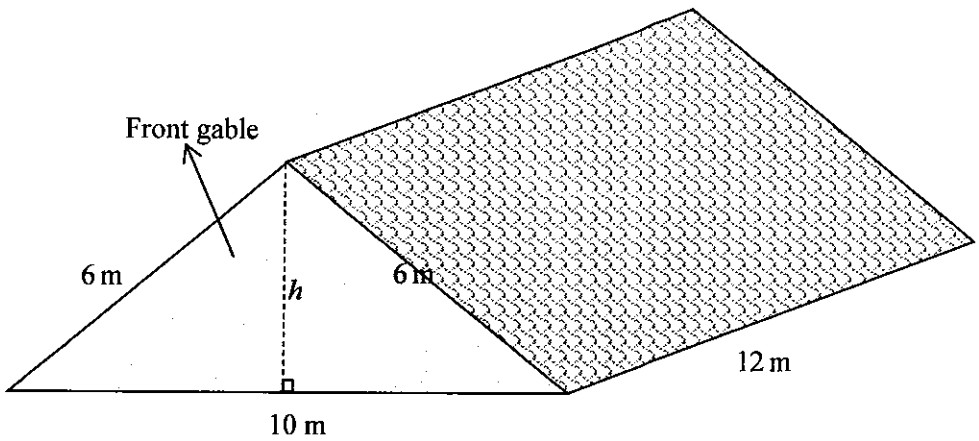
Area $\Delta DEF = \frac{6 \times 12}{2} = 36 cm^2$ ✓

4 : 36

1 : 9 or $\frac{1}{9}$ ✓

(6)

Question 11



The roof of a home is in the shape of a triangular prism.

11.1 Determine the height (h) of the support beam for the roof correct to 2 decimal places (2)

$h = \sqrt{6^2 - 5^2}$ ✓

$\approx 3,32 \text{ m}$ ✓

11.2 Calculate the area of the whole roof, including the front and back gables. (3)

$SA = \frac{2(10 \times 3,32)}{2} + 2(10 \times 6)$ ✓ ✓

$= 177,20 \text{ m}^2$ ✓

5

Question 12

The results of 30 Grade 9 pupils for a Maths test, are as represented in a stem and leaf diagram as follows.

Stem	Leaf
2	6
3	0 1 4 6 9 9
4	2 3 5 8 9 9
5	2 2 3 3 6 8
6	1 2 4 6 9
7	0 2 5
8	1 8
9	1
Key 4/2 =42	

12.1 Determine the range of the test marks. (1)

$91 - 26 = 65\%$

12.2 Calculate the mean. (2)

$\frac{1634}{30} \approx 54,47\%$

12.3 Determine the median. (1)

$\frac{52+53}{2} = 52\frac{1}{2}\%$

12.4 If 40% is the pass mark, what percentage of the class failed the test? (1)

$\frac{7}{30} = 23\%$

12.5 Comment on the difficulty of the test. Use statistical reasoning to back-up your comment. (2)

High range of marks → quite different

23% failed

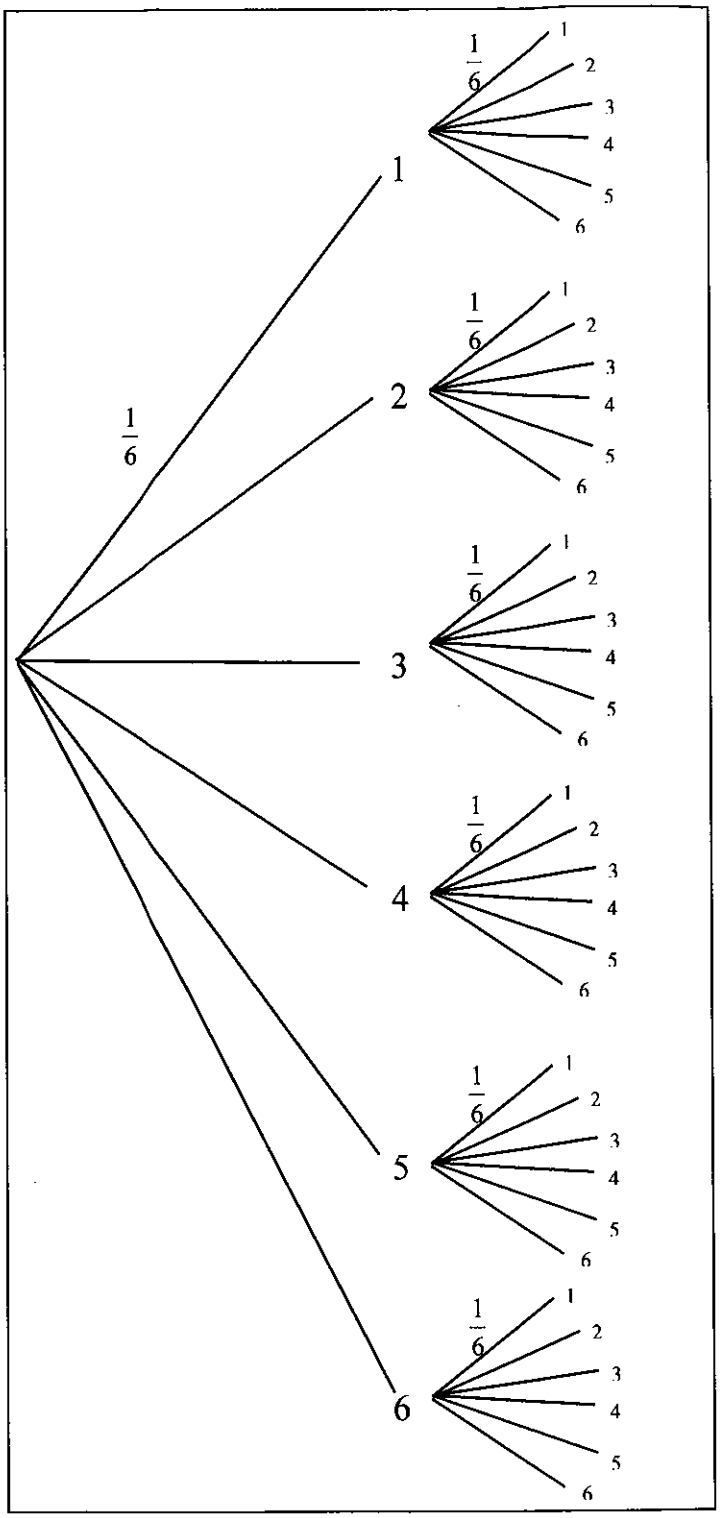
low mean

7

Question 13

The partially completed tree diagram represents two dice which have been thrown at the same time.

Use the diagram to assist you to answer the questions which follow.



What is the probability of:

13.1 throwing two 3's? (1)

$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ ✓

13.2 obtaining a total of 7? (1)

$\frac{1}{36} \times 6 = \frac{6}{36} = \frac{1}{6}$ ✓

13.3 the total being greater than 7? (1)

$\frac{15}{36}$ ✓

13.4 the total being less than 8? (1)

$\frac{21}{36}$ ✓

4

Bonus Questions

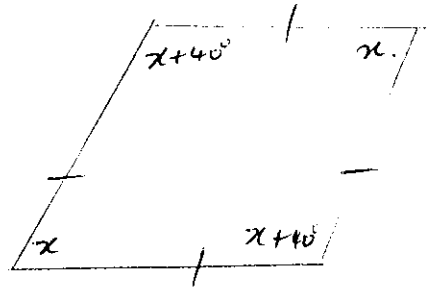
1. Consider a rhombus. If the sizes of any two angles that are not opposite to each other differ by 40°, what is the size of one of the smaller angles? (2)

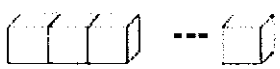
$2(x+40) + 2x = 360^\circ$

$2x + 80 + 2x = 360$

$4x = 28$

$x = 70^\circ$



2.  (100 cubes)

The surface area of a cube is 6 cm^2. If 100 cubes are put together end-to-end as shown, what is the surface area of the resulting shape (in cm^2)? (2)

Area of each face is 1cm^3

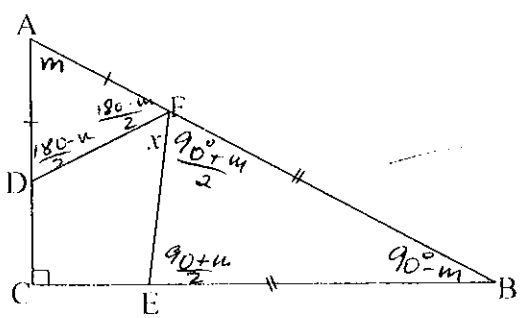
# of exposed faces $= 5 + 4 + 4 \ldots 4 + 5$ (100 terms)

$= 98 \times 4 + 2 \times 5$

$= 402$

Area of exposed faces $402\ \text{cm}^3$

3. In the diagram, CD = CE, BE = BF and $\hat{C} = 90°$. Determine the size of x. (2)



$= \frac{180-(90-m)}{2}$

$= \frac{180-90+m}{2}$

$= \frac{90°+m}{2}$

$\frac{180-m}{2} + x + \frac{90+m}{2} = 180^\circ$

$180^\circ - m + 2x + 90^\circ + m = 360^\circ$

$2x = 90^\circ$

$x = 45^\circ$