NAME	MARK
MEMO (PW)	
TEACHER	
CLASS	**PERCENTAGE**

HERZLIA MIDDLE SCHOOL

Q1.7 - border or not?

Book 2 - Venn diagrams

GRADE 9

MATHEMATICS EXAMINATION

PAPER 2

21 November 2017

TIME: 75 Minutes

MARKS: 80

This paper consists of 15 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 in the questions that follow:

1.1 A circle has a diameter of 6 cm. What is the area in cm^2 of a quarter of the circle? (1)

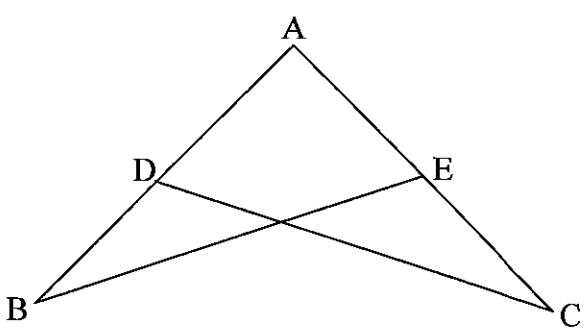
A 36π

B 9π

(C) $\frac{9\pi}{4}$

D $\frac{9\pi}{2}$

1.2 In the figure below, AB = AC and AE = AD. Why is $\Delta ABE \equiv \Delta ACD$? (1)



A SSS

B RHS

(C) SAS

D AA corr. S

1.3 One exterior angle of a regular octagon is_____ degrees. (1)

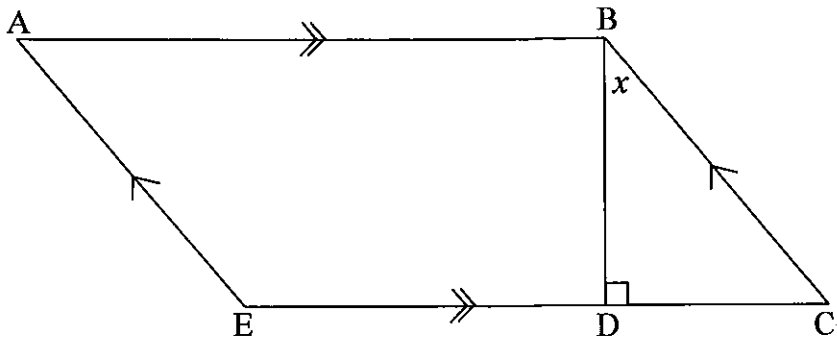
(A) 45

B 80

C 135

D 360

1.4 The size of AÊC in terms of x in the diagram below is: (1)



A x

B $90° - x$

(C) $90° + x$

D $2x$

1.5 A rectangular tank with a length of 50 cm and a width of 30 cm contains 24 ℓ of water. The depth of the water is: (1)

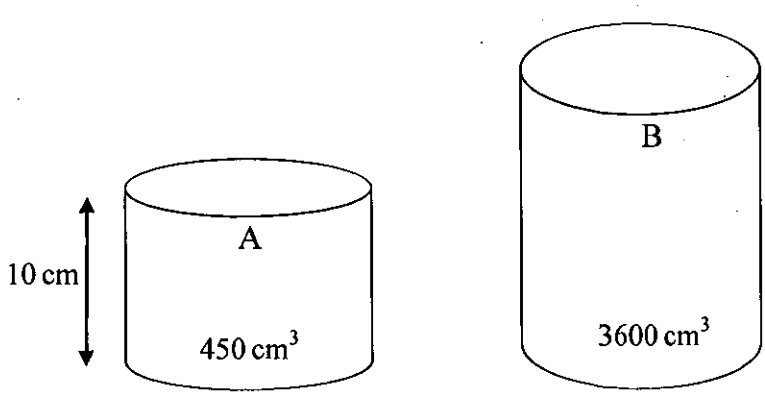
A 12,6 cm

B 14,4 cm

(C) 16 cm

D 40 cm

1.6 A and B are two similar cylinders with equal bases. The height of cylinder A is 10 cm and its volume is 450 cm^3. The volume of cylinder B is 3600 cm^3. The height of cylinder B is: (1)



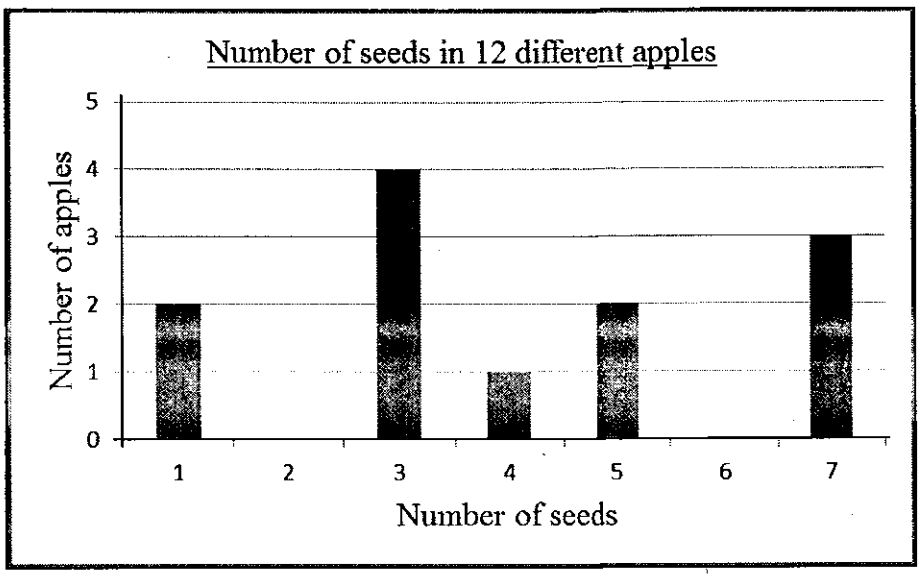
A 40 cm

(B) 80 cm

C 160 cm

D 200 cm

1.7 In the bar graph below, which one of the following is closest to the mean number of seeds per apple? (1)



A 2
B 3
(C) 4
D 5

border or not?

1.8 A fair blue dice has its faces marked with the numbers 2; 2; 2; 2; 3 and 3.
A fair red dice has its faces marked with the numbers 1; 1; 2; 2; 2 and 3.
If you roll the two dice at the same time, what is the probability of getting a double two? (1)

(A) $\frac{1}{3}$
B $\frac{1}{6}$
C $\frac{2}{9}$
D $\frac{7}{12}$

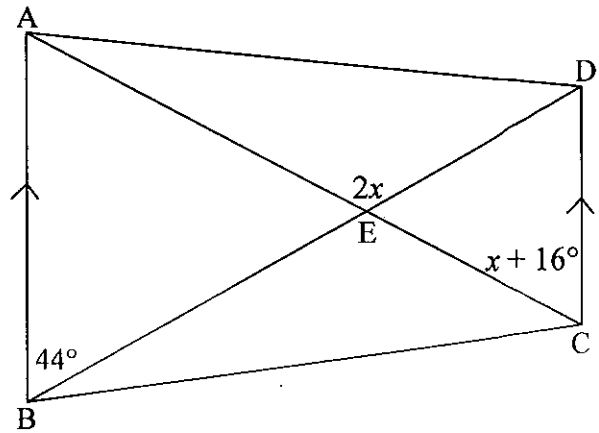
$\frac{4}{6} \times \frac{3}{6}$

(2)

Question 2

Solve for x in the diagrams below, giving reasons where necessary:

2.1 (5)

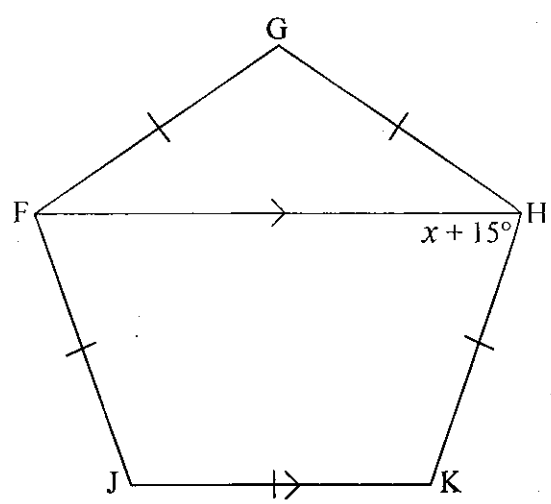


$\hat{BDC} = 44°$ ✓ (alt ∠'s; AB // DC) ✓

$2x = x + 16 + 44$ (ext ∠ of $\triangle$ CDE) ✓

$\therefore x = 60°$ ✓

2.2 (5)



$JKH = 540 \div 5$ (∠'s of regular pentagon FGHKJ) ✓

$= 108°$ ✓

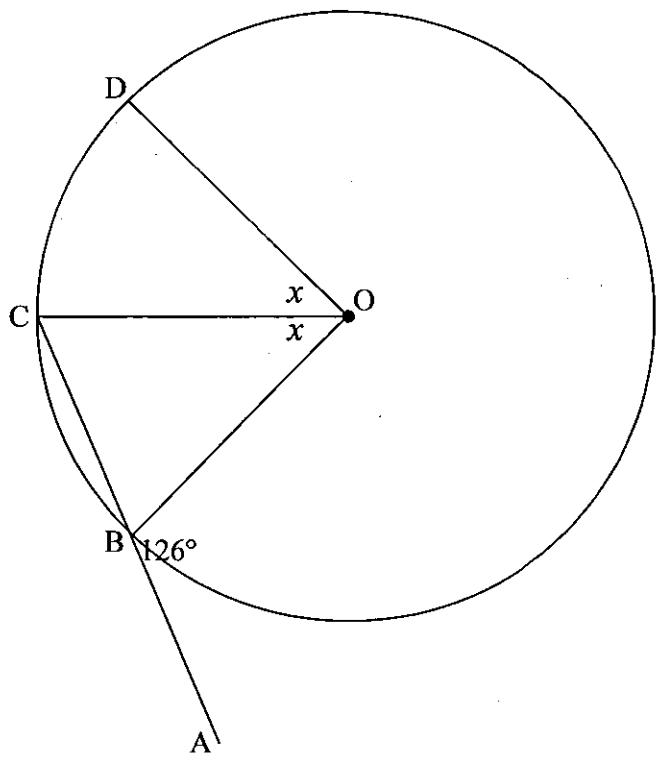
$x + 15° + 108° = 180°$ (co-int ∠'s; FH // JK) ✓

$x = 57°$ ✓

Question 3

In the diagram below, O is the centre of the circle, $A\hat{B}O = 126°$ and $B\hat{O}C = C\hat{O}D = x$.

Calculate the size of reflex angle $B\hat{O}D$, giving reasons. (8)



OC = OB (radii)

$C\hat{B}O$ = 54° (L's on str. line CA)

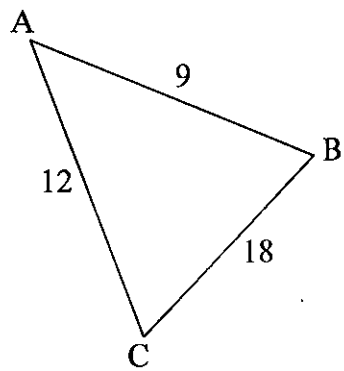
x = 72° (L's in isos Δ BOC)

$\therefore$ reflex $B\hat{O}D$ = 360° − 2(72) (L's around pt O)

= 216°

Question 4

ΔABC is not drawn to scale.
Determine whether ΔABC is a right angled, obtuse angled or acute angled triangle. (6)



$BC^2 = 18^2 = 324$ ✓

$AC^2 + AB^2 = 12^2 + 9^2 = 225$ ✓

$BC^2 > AC^2 + AB^2$ ✓

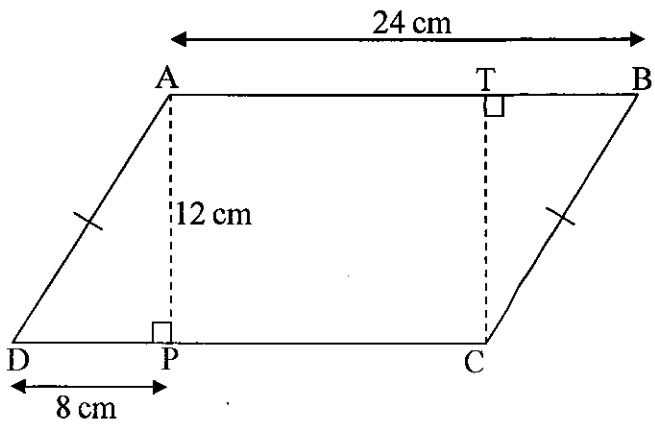
$\therefore B\hat{A}C > 90^\circ$ ✓ ✓ (converse of Py mag.)

$\therefore$ ΔABC is an obtuse ✓ L'd, scalene Δ

(6)

Question 5

Given the diagram below, with AB = DC, answer the questions that follow:



5.1 Classify quadrilateral ABCD and give reason for your classification. (2)

ABCD is a parm. ✓
(both pairs of opp sides equal) ✓

5.2 Calculate the area of quadrilateral ABCP. (2)

$A = \frac{(16+24)\cdot 12}{2}$ ✓

$= 240\ cm^2$ ✓

5.3 Why is AP = TC? (1)

⊥ lines between // lines AB and DC ✓

5.4 Prove that ΔAPD ≡ ΔCTB. (4)

In Δ APD and ΔCTB

1. AP = TC (proved above) ✓
2. $\hat{D} = \hat{B}$ (opp. ∠s parm ABCD) ✓
3. AD = BC (given) ✓

∴ Δ APD ≡ ΔCTB (SAS) ✓

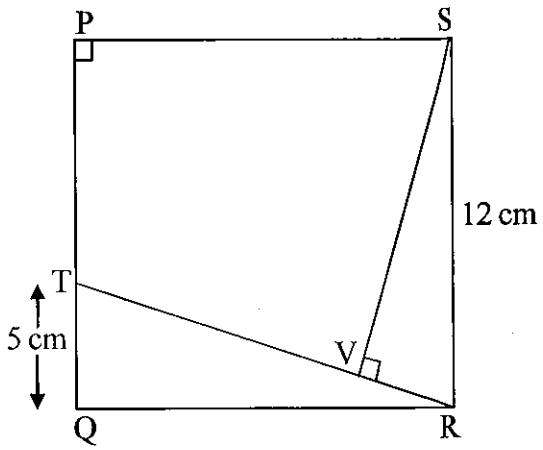
OR

1. $A\hat{P}D = C\hat{T}B = 90°$ (given) ✓
2. AD = BC (given) ✓
3. AP = TC (proved above) ✓

∴ Δ APD ≡ ΔCTB (RHS) ✓

Question 6

In the diagram below, PQRS is a square. T lies on PQ and SV ⊥ TR.



6.1 Prove that ΔQTR ||| ΔVRS (5)

In Δ QTR and ΔVRS
$T\hat{Q}R = S\hat{V}R = 90°$ (angles in square = 90°)
$Q\hat{T}R = V\hat{R}S$ (all L's; PQ || SR)
3rd angle equal (L's in Δ)
∴ ΔQTR ||| ΔVRS (AAA)

6.2 Calculate the length of TR. (3)

$TR = \sqrt{12^2 + 5^2}$ (Pyth. in ΔTQR)
$= 13$ cm

6.3 Calculate the length of VS, rounded off to 2 decimal places. (3)

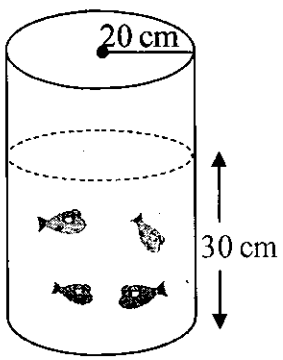
$\frac{QR}{VS} = \frac{TR}{RS}$ (||| Δs)

$\frac{12}{VS} = \frac{13}{12}$

∴ VS = 11,08 cm

Question 7

Goldfish are kept in a cylindrical tank which has a radius of 20 cm. The tank is filled to a height of 30 cm with water.



7.1 Each fish needs 1 litre of water. How many fish can the cylinder hold?
[1 cm^3 = 1 mℓ] (4)

$V = \pi \times 20^2 \times 30$ ✓

$\approx 37\,699,11\ cm^3$ ✓

$\approx 37\,699,11\ ml$ ✓

$= 37,699\ \ell$ ✓

∴ you can hold 37 fish in the cylinder ✓

7.2 You decide to clean the inside of the tank. What area will you have to clean if the tank is 50 cm high? (2)

$SA = (\pi \times 20^2) + (\pi \times 40 \times 50)$ ✓

$= 7539,8223\ldots$

$\approx 7539,82\ cm^2$ ✓

(6)

Question 9

Liam's Grade 11 Exam marks that he got in 6 of his 7 subjects are as follows:

English:	73%
Afrikaans:	69%
Maths:	85%
Physics:	82%
Life Sciences:	90%
Chemistry:	75%

9.1 Determine the range of the marks. (1)

$90 - 69 = 21$ ✓

9.2 Calculate the difference between the mean and the median marks for these 6 subjects (5)

$\text{mean} = \frac{474}{6}$ ✓

$= 79\%$ ✓

$\text{median} = \frac{75 + 82}{2}$ ✓

$= 78{,}5\%$ ✓

$\text{Difference} = 79 - 78{,}5$

$= 0{,}5\%$ ✓

9.3 UCT requires an average of 80% across 7 subjects for entrance into the BSc programme. What mark does Liam need to get for Life Orientation in order to study a BSc degree? (2)

$(7 \times 80) - 474$ ✓

$= 86\%$ needed ✓

OR

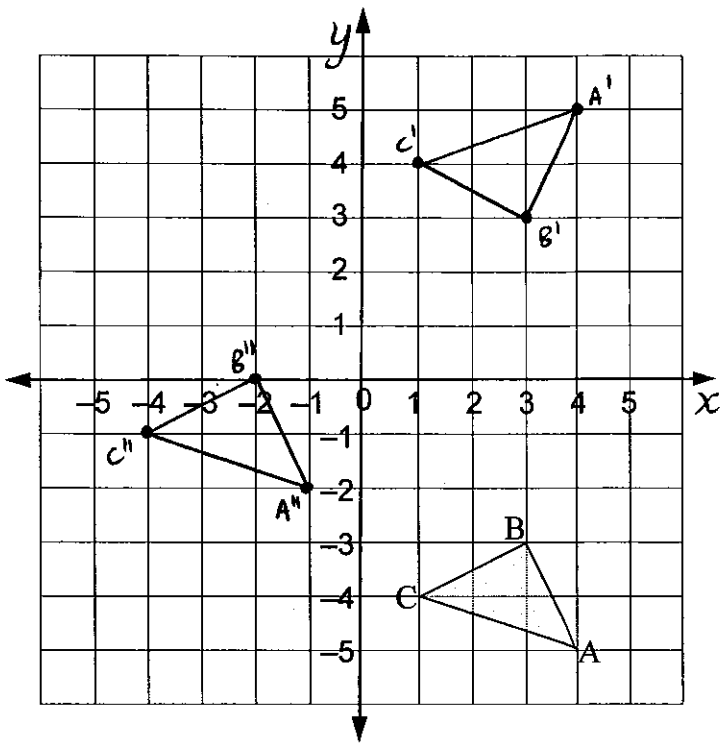
$\frac{474 + x}{7} = 80$

$\therefore x = 86\%$

8

Question 8

In the given sketch, A (4; –5), B (3; –3) and C (1; –4) are the co-ordinates of ΔABC.



8.1 ΔABC is reflected about the x-axis to form ΔA'B'C'.
Make a neat labelled sketch of ΔA'B'C'. ✓✓ (2)

8.2 ΔABC is translated 3 units up and 5 units left to form ΔA"B"C".
Make a neat labelled sketch of ΔA"B"C". ✓✓ (2)

8.3 ΔABC is reflected about the line $y = x$ to form ΔA'"B'"C'".
Write down the co-ordinates of C'". (–4 ; 1) ✓✓ (1)

8.4 Write down the algebraic rules for the transformations you performed on ΔABC of the triangle in Questions 8.2 and 8.3. (2)

A $(x ; y)$ → A" ($x - 5$ ✓ ; $y + 3$ ✓)

A $(x ; y)$ → A'" (y ✓ ; x ✓)

7

Question 10

576 teens volunteer their help at various charities around Vredehoek. A sample of this population was surveyed and the results were tabulated. Each person only selected one reason as to why they volunteered.

Reason	*Frequency*
To help others	47
I enjoy the work	38
I have lots of free time	25
To learn	24
To help a friend	20
Religious reasons	19
Past experience	10
Other	7
I don't know	2

10.1 How many teens were surveyed? (1)

192 ✓

10.2 Using this information, how many teens in Vredehoek volunteered because they 'enjoy the work'? (1)

$\frac{38}{192} \times 576$ ✓

= 114 teens ✓

10.3 If you had to draw a pie chart of the data in the table, how many degrees would the sector 'To help a friend' be? (2)

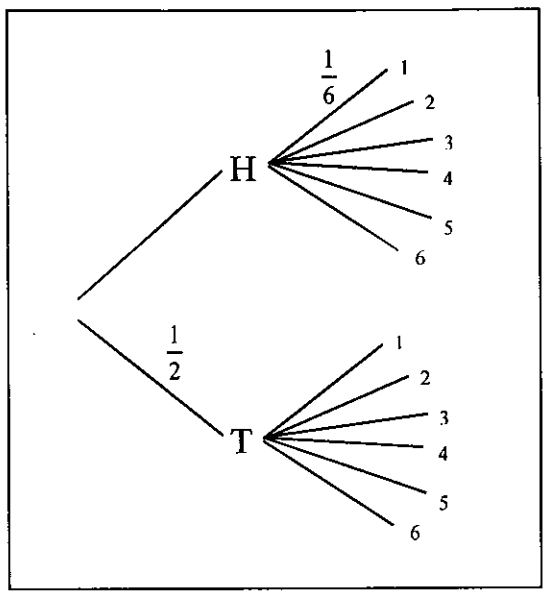
$\frac{20}{192} \times 360$ ✓

= 37,5° ✓

4

Question 11

The partially completed tree diagram below represents a coin which is flipped and a dice that is rolled thereafter.



11.1 What is the probability that you flip a tail on the coin and get a five on the dice? (1)

$\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$ ✓

11.2 What is the probability that you get a tail and a factor of 6? (1)

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

11.3 What is the probability that you flip two tails in a row? (1)

0 ✓

3

BONUS QUESTIONS

1. Anne, Bongi and Carol are wearing dresses and shoes that are green, black or yellow. No two dresses or pairs of shoes are the same colour. Anne has yellow shoes. Bongi does not have a black dress or black shoes and only Carol has the same colour dress and shoes. What colour dress and shoes does Bongi have? (1)

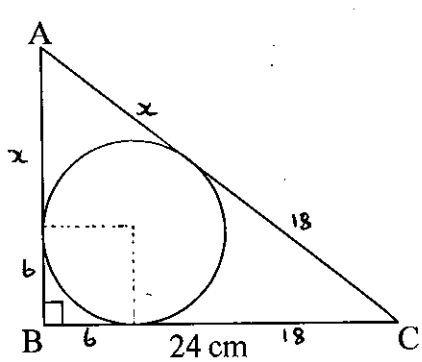
Bongi has — yellow dress
— green shoes ✓

2. A survey of 80 people at a local food outlet indicated their meal preferences: (1)

44 people like Pap (P)
33 people like Burgers (B)
39 people like Fried Chicken (FC)
x people like Pap and Burgers, but not Fried Chicken
23 people like Pap as well as Fried Chicken
19 people like Burgers and Fried Chicken
9 people like Pap, Burgers and Fried Chicken
69 people like at least one of these meals

Determine the value of x.

3. The radius of the inscribed circle of the right-angled triangle below is 6 cm. The length of one of the shorter sides is 24 cm. What is the area of ΔABC? (2)



$(x+6)^2 + 24^2 = (x+18^2)$ (Pythag in ΔABC)

$x^2 + 12x + 36 + 576 = x^2 + 36x + 324$

$12x + 612 = 36x + 324$ ✓

$-24x = -288$

$\therefore x = 12$ cm

$\therefore A = \frac{24 \times 18}{2}$

$= 216 \text{ cm}^2$ ✓