Name:

Teacher:

MARCELLIN COLLEGE RANDWICK

Mathematics

Year 8.1 and 8.4

Yearly Examination

Time Allowed : 45 minutes

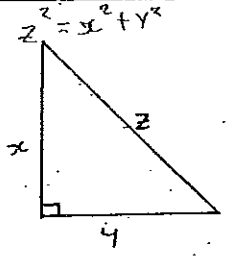
INSTRUCTIONS : Write only in blue or black pen
Write answers only in Part A
Show all necessary working in Part B and Part C
Marks will be deducted for careless, untidy or badly arranged work
Calculators may be used.

The exam consists of three parts

Part A	Answer Only (1 mark each)	20 marks
Part B	Short Answer (2 marks each)	30 marks
Part C	Longer Answer (marks indicated)	15 marks
	BONUS QUESTION	5 marks
TOTAL		65 marks

PART A	PART B	PART C	TOTAL	%

PART A. (Write answers in the spaces provided) (1 mark each

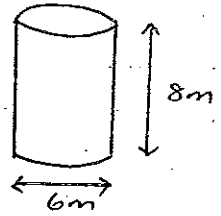
QUESTION	ANSWER
1. Simplify $5a^2b \times 2ab$	
2. Simplify the ratio 16 : 28	
3. Expand and simplify $4(x+3) - 2x$	
4. Factorise $6ab - 3b$	
5. A CD has a radius of 6cm. Find its area to the nearest cm^2	
6. Simplify the ratio $\frac{3}{8} : \frac{10}{16}$	
7. Calculate $\frac{13\pi + 42.8}{86.5 + 3.25}$ to 3 d.p.	
8. The number halfway between 0.09 and 0.1 is	
9.  Consider the right-angled triangle. Which of the following is true? A. $x^2 = y^2 + z^2$ B. $x^2 = y^2 - z^2$ C. $y^2 = x^2 + z^2$ D. $y^2 = z^2 - x^2$	
10. Find the difference between the mean and the mode of these scores 30 50 60 30 70	
11. Find 37% of $630	

12. Solve $4a + 9 = 25$

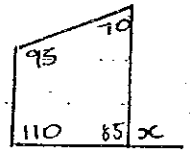
13. Calculate, to 1 decimal place, the circumference of a circle which has a radius of 4cm.

14. Expand $4(2x + 7)$

15. Determine the volume of the figure below (to 2 d.p.)

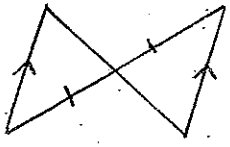


6. A tap is leaking at the rate of 15mL every 10 seconds. Find the amount of water wasted each day.



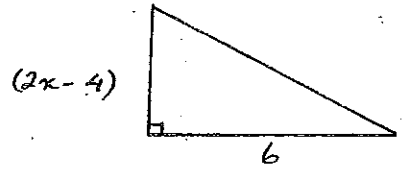
Find the value of x

i. Name the test you would use in proving the following pairs of triangles are congruent



19. If $E = \frac{1}{2}mv^2$, find E given $m = \frac{1}{2}$, $v = 8$

20. Write an expression to find the area of the following figure



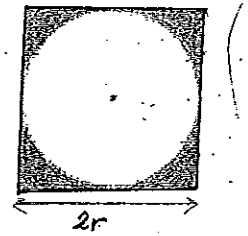
Part B (Write Answers in the space provided) (2 marks each)

1. Solve the following

$$\frac{3x - 4}{2} = \frac{2x + 5}{3}$$

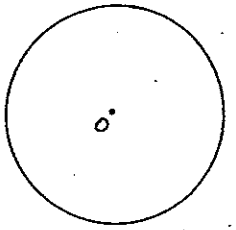
2. Simplify $\frac{3ab^2}{12} \times \frac{-4ab}{a^2b}$

3. Write a completely factorised expression for the shaded region below.

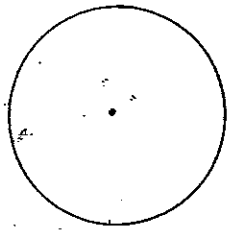


On the following 2 circles you are asked to:

i) Draw a sector POA



ii) Divide the circle into a major segment and a minor segment. Label the two parts

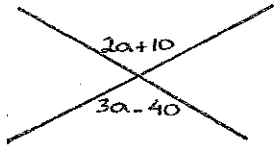


A ship sails to a point 15 miles due east of a point P. It then sails 5 miles due north, to a point N.

a) Show the information on a diagram

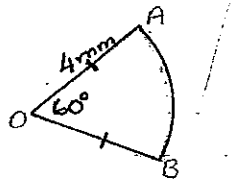
b) Find the distance PN between the ship and its port

6. Find the value of a. Show all working and give a reason

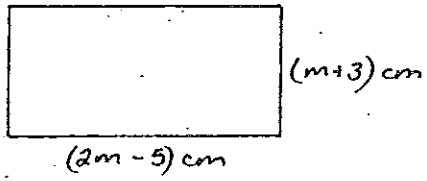


7. A dry concrete mix is made by mixing gravel, sand and cement in the ratio 6:4:1. To make 66kg of the concrete mix, what mass of sand will be needed?

8. Find the perimeter of the following sector, to the nearest mm



9. A rectangle with length $(2m-5)$ cm and breadth $(m+3)$ cm has a perimeter of 62 cm. Find the value of m.



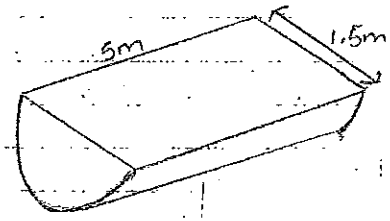
10. Simplify $\frac{7x}{4} - \frac{5x-2}{3}$

11. The lines $x=0$, $y=0$, $x=3$ and $y=4$ are graphed on the same number plane. The four lines enclose a region of the number plane.

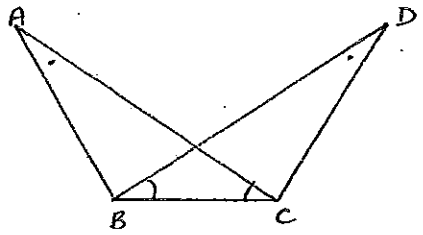
a) What is the shape of the enclosed region?

b) Find the area of this enclosed region.

12. A watering trough is constructed by slicing a cylinder down the centre giving a solid with semi-circles at each end. Calculate the capacity of the trough in kilolitres!

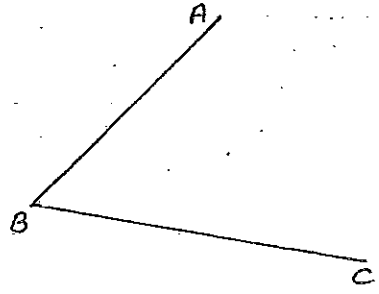


13. In the diagram, $\angle CAB = \angle CDB$ and $\angle BCA = \angle DBC$
Prove $\Delta ABC \equiv \Delta DBC$ (giving reasons)



14. A metre ruler casts a shadow 0.5m long. At the same time, a building casts a shadow 10m long. Use similar triangles to calculate the height of the building (HINT: Draw a diagram)

15. Bisect the following angle, showing construction lines



PART C (Write answers in the spaces provided) (marks indicated)

Question 1 (6 marks)

A salesperson makes the following sale of T-shirts over a week. The size of the T-shirts is recorded below

12 8 10 12 12 14 10 12 8 6
8 16 10 12 14 12 10 12 10 14

a) Complete the frequency distribution table

x	Tally	f	fx
6			
8			
10			
12			
14			
16			
		$\Sigma f =$	$\Sigma fx =$

b) Identify the following central tendencies

i) mode =

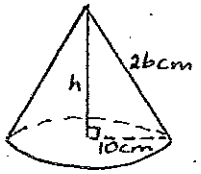
ii) mean =

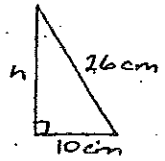
iii) median =

c) If you were the salesperson, which of the three central tendencies listed above would be most important to you?
(Give a reason to support your answer)

Question 2 (4 marks)

A cone has a slant height of 26cm and base radius of 10 cm

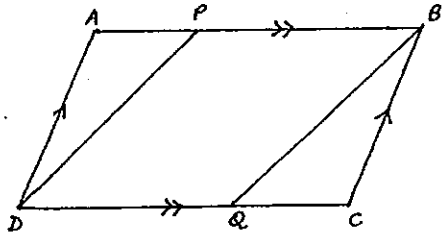




a) Calculate the perpendicular height of the cone.

b) Calculate the volume of the cone, correct to the nearest cm^3

Question 3 (5 marks)



ABCD is a parallelogram

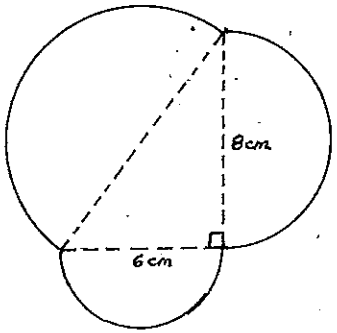
AP = QC

Prove PD = BQ (giving reasons)

BONUS QUESTION (5 marks)

Calculate the area of the shape below.

(NOTE: Assume semi-circular shapes on each side of the triangle).



Name:

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ANSWERS

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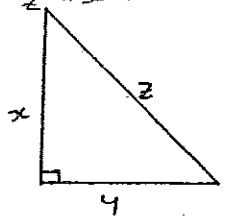
PART A	PART B	PART C	TOTAL	%

$A = \pi r^2$
$C = \pi D$

PART A. (Write answers in the spaces provided) (1 mark each)

QUESTION	ANSWER
1. Simplify $5a^2b \times 2ab$	$10a^3b^2$ ✓
2. Simplify the ratio 16 : 28	4:7 ✓
3. Expand and simplify $4(x+3) - 2x$	$4x+12-2x$ $=2x+12$ ✓
4. Factorise $6ab - 3b$	$3b(2a-1)$ ✓
5. A CD has a radius of 6cm. Find its area to the nearest cm^2	$A=\pi r^2$ $A=\pi \times 6^2$ $=113cm^2$ ✓
6. Simplify the ratio $\frac{3}{8} : \frac{10}{16}$	$\frac{3}{5}$ ✓
7. Calculate $\frac{13\pi + 42.8}{86.5 + 3.25}$ to 3 d.p.	0.932 ✓
: The number halfway between 0.09 and 0.1 is	0.095 ✓
: $z^2 = x^2 + y^2$  Consider the right-angled triangle Which of the following is true? A. $x^2 = y^2 + z^2$ B. $x^2 = y^2 - z^2$ C. $y^2 = x^2 + z^2$ D. $y^2 = z^2 - x^2$	D. $y^2 = z^2 - x^2$ ✓
. Find the difference between the mean and the mode of these scores 30 50 60 30 70	Mode: 30 Mean: $\frac{30+50+60+30+70}{5}$ $=48$ $48-30$ $=18$ ✓
Find 37% of $630	$233.10 ✓

12. Solve $4a + 9 = 25$ $a = \frac{25-9}{4}$

$a = 4$ ✓

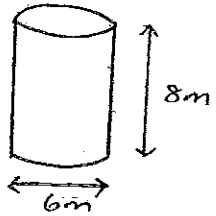
13. Calculate, to 1 decimal place, the circumference of a circle which has a radius of 4cm. $C = \pi D$

$C = \pi D$
$= \pi \times 8$
$= 25.1\text{cm}$ ✓

14. Expand $4(2x + 7)$

$8x + 28$ ✓

15. Determine the volume of the figure below (to 2 d.p.)



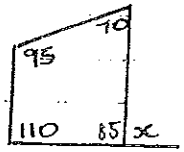
$\pi (3)^2 \times 8$
$= 226.19\text{m}^3$
(to 2 d.p.)

$V = \pi r^2 \times 8m$
$= \pi \times 3cm \times$ ~~cm~~
$= 7530.82cm^3$,
$V = \pi r^2 h$
$= \pi . 3^2 . 8$
$= 72\pi\ cm^3$ ✗

16. A tap is leaking at the rate of 15mL every 10 seconds. Find the amount of water wasted each day.

129 600mL ✓

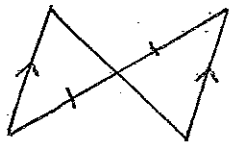
17.



Find the value of x

$x = 95°$ ✓

18. Name the test you would use in proving the following pairs of triangles are congruent



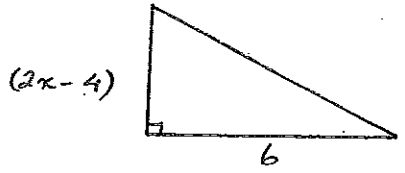
~~SAS~~
A.A.S. ✗

19. If $E = \frac{1}{2}mv^2$, find E given $m = \frac{1}{2}$, $v = 8$

$\frac{1}{2} \times (0.5 \times 8^2)$

$E = 16$ ✓

20. Write an expression to find the area of the following figure



$A = \frac{bh}{2}$

$\frac{6x(2x-4)}{2} = A$

$A = 6x - 12$

✗

Part B (Write Answers in the space provided) (2 marks each)

1. Solve the following

$\frac{3x-4}{2} = \frac{2x+5}{3}$

$3(3x-4) = 2(2x+5)$
$9x - 12 = 4x + 10$
$5x = 22$
$x = 4.4$

✓ 2

2. Simplify $\frac{2ab^2}{xz} \times \frac{-4ab}{a^2b}$

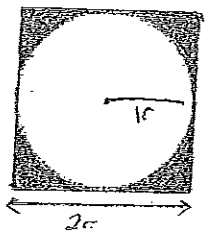
$\frac{b}{1} \times \frac{-b}{1}$

$\frac{-b^2}{1}$

✗ 1

$A = \pi r^2$

3. Write a completely factorised expression for the shaded region below.

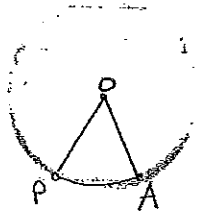


$A = (2r)^2 - [\pi \times (r)^2]$

X 1

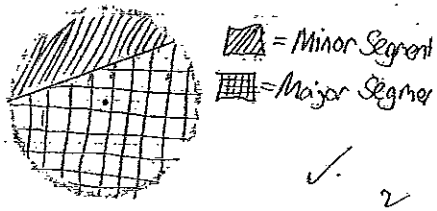
4. On the following 2 circles you are asked to:

i) Draw a sector POA



✓

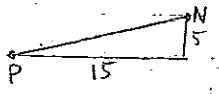
ii) Divide the circle into a major segment and a minor segment. Label the two parts



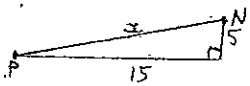
✓ 2

. A ship sails to a point 15 miles due east of a point P. It then sails 5 miles due north, to a point N.

) Show the information on a diagram



b) Find the distance PN between the ship and its port



X

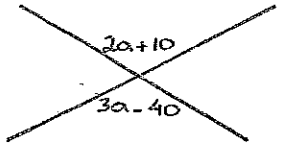
$x^2 = 15^2 + 5^2$

$x \div 15.8$ miles

✓ 2

5

6. Find the value of a. Show all working and give a reason



$2a + 10 = 3a - 40$ (Opposite Angle)

$50 = a$

✓ 2

7. A dry concrete mix is made by mixing gravel, sand and cement in the ratio ~~6:4:1~~ To make 66 kg of the concrete mix, what mass of sand will be needed?

6:4:1

6:5:C

~~Mass of Sand = $\frac{4}{11} \times 66$ kg~~

~~= 24 kg of Sand will be Needed~~

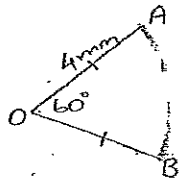
11 parts = 66 kg

1 part = 6 kg

∴ Mass of sand = 4×6 = 24 kg

X 1

8. Find the perimeter of the following sector, to the nearest mm



Sector = $\frac{1}{6}$ of a circle $(360 \div 60)$

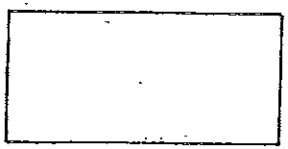
$P = \frac{\pi D}{6} + 4 + 4$

~~$P \div 10$mm~~

$P = 12$ mm.

X

9. A rectangle with length $(2m - 5)$ cm and breadth $(m+3)$ cm has a perimeter of 62 cm. Find the value of m.



$31 = 2m - 5 + m + 3$

$33 = 3m$

$\therefore 11 = m$

✓ 2

1

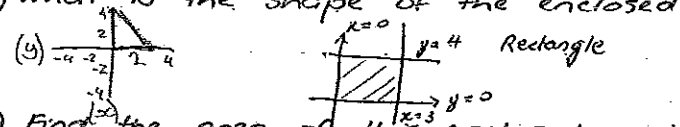
10. Simplify $\frac{7x}{4} - \frac{5x-2}{3}$

$\frac{21x - 20x + 8}{12} = \frac{x+8}{12}$

X 1

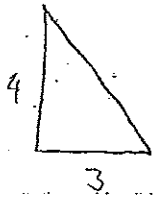
11. The lines $x=0$, $y=0$, $x=3$ and $y=4$ are graphed on the same number plane. The four lines enclose a region of the number plane.

a) What is the shape of the enclosed region?



Rectangle

b) Find the area of this enclosed region.



$A = \frac{BH}{2}$

$= \frac{4 \times 3}{2}$

$= 6$ units^2

$A = 3 \times 4 = 12\ u^2$

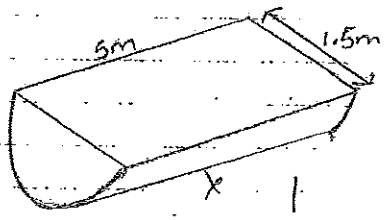
✓ 1

12. A watering trough is constructed by slicing a cylinder down the centre giving a solid with semi-circles at each end. Calculate the capacity of the trough in kilolitres $A = \pi r^2$

$V = \frac{1}{2}\pi \times r^2 \times h$

$= \frac{1}{2}\pi \times 0.75^2 \times 5m$

$= \frac{8.84m^3}{2} = 4.42\ m^3$



X 1

$1\ m^3 = 10^6\ cm^3 = 10^6\ mL$

$= 10^3 L$

$V = \frac{1}{2}\pi r^2 h$

$= \frac{1}{2}\pi (.75)^2 \times 5$

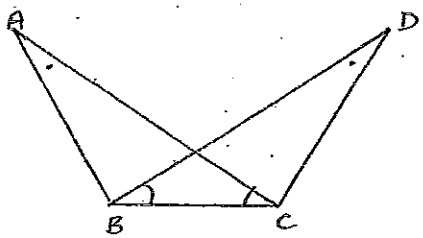
$V = 4.42 \times 10^3\ L$

$= 4.42\ kL$

2

In the diagram, $\angle CAB = \angle CDB$ and $\angle BCA = \angle DBC$

Prove $\triangle ABC \equiv \triangle DBC$ (giving reasons)



In $\triangle ABC$ and $\triangle DBC$

$\angle CAB = \angle BDC$ (Given) ✓

$\angle ACB = \angle DBC$ (Given)

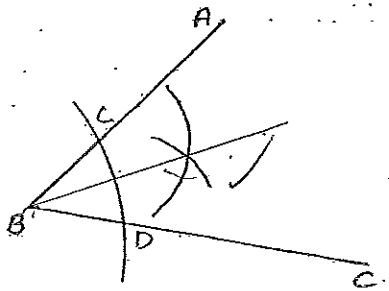
$BC = CB$ (Common)

$\therefore \triangle ABC \equiv \triangle DBC$ (AAS) ✓

(

A metre ruler casts a shadow 0.5m long. At the same time, a building casts a shadow 10m long. Use similar triangles to calculate the height of the building (HINT: Draw a diagram)

Bisect the following angle, showing construction lines



PART C (Write answers in the spaces provided) (marks indicated)

Question 1 (6 marks)

A salesperson makes the following sale of T-shirts over a week. The size of the T-shirts is recorded below

12	8	10	12	12	14	10	12	8	6
8	16	10	12	14	12	10	12	10	14

a) Complete the frequency distribution table

x	Tally	f	fx
6	I	1	6
8	IIII	3	24
10	IIII	5	50
12	IIII II	7	84
14	III	3	42
16	I	1	16
		20	222

✓ 2

b) Identify the following central tendencies

i) mode = 12

ii) mean = $\frac{222}{20}$ = 11.1

iii) median = 12

✓ ✓ ✓ 3

c) If you were the salesperson, which of the three central tendencies listed above would be most important to you?

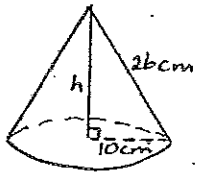
(Give a reason to support your answer)

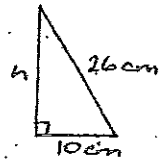
Mode 12, most T-shirts sold in size 12.

X

Question 2 (4 marks)

A cone has a slant height of 26cm and base radius of 10 cm





Calculate the perpendicular height of the cone.

$h^2 = 26^2 - 10^2$ ✓

$h^2 = 676 - 100$ ✓

$h^2 = 576$

$h = \sqrt{576}$ ✓

$\therefore h = 24$

Calculate the volume of the cone, correct to the nearest cm^3 ?

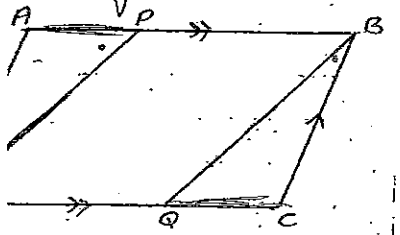
$V_{cone} = \frac{1}{3}\pi r^2 h$

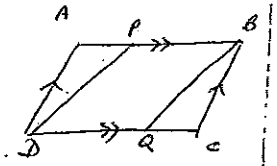
$= \frac{1}{3}\pi (10^2)(24)$ continue...

$= 2513\ cm^3$ (to the nearest cm^3)

(6)

Question 3 (5 marks)





ABCD is a parallelogram

AP = QC

Prove PD = BQ (giving reasons)

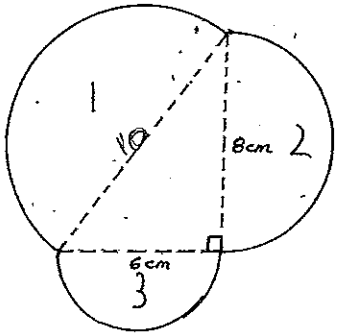
?

Ti: Δ's show that Δ APD ≡ Δ CBQ ... try again

BONUS QUESTION (5 marks)

Calculate the area of the shape below.

(NOTE: Assume semi-circular shapes on each side of the triangle)



$x^2 = 8^2 + 6^2$

$x^2 = 64 + 36$

$x^2 = 100$

$x = \sqrt{100}$

$x = 10$ ✓

Area of Circle 1 $= \pi \times 5 \times 5 \times \frac{1}{2}$

$= 39.3 cm^2$ ✓

Area of circle 2 $= \pi \times \frac{1}{2} \times 4 \times 4$

$= 25.13 cm^2$ ✓

Area of circle 3 $= \pi \times 3 \times 3 \times \frac{1}{2}$

$= 14.14 cm^2$ ✓

Area of triangle $= \frac{1}{2} \times 8 \times 6$

$= 24 cm^2$ ✓

total area $= 39.3 cm^2 + 25.13 cm^2 + 14.14 cm^2 + 24 cm^2$

$= 102.6 cm^2$ ✓