NAME: SOLUTIONS

TEACHER: **CDO** **JWL/SRO** **IMO** **ADA**

St Aloysius' College

Yearly Examination

2019

YEAR 9 MATHEMATICS Stage 5.3

General Instructions

Reading time – 5 minutes

Working time – $1\frac{1}{2}$ hours

- Write using black pen only.
- Board approved calculators may be used
- All necessary working should be shown in every question in the spaces provided.
- Marks will be deducted for careless and poorly arranged work
- Examination papers must NOT be removed from the examination room.

Total marks – 70

Attempt all questions

Section I – Multiple Choice **(20 Marks)**

- All questions are 1 mark
- Answer on the separate multiple choice answer sheet

Section II – Free Response **(25 marks)**

Section III – Free Response **(25 marks)**

Section I

20 marks
Attempt Questions 1 - 20

Use the multiple-choice answer sheet for Questions 1-20

1 Simplify $4(y+2)+3$. $4y+8+3$

(A) $4y+5$

(B) $4y+9$

(C) $4y+11$

(D) $4y+20$

2 What is the simple interest on \$500 for 3 years at 15% p.a. ?

(A) \$225

(B) \$275 $500 \times 3 \times 0.15$

(C) \$725

(D) \$760.44

3 What is 5 million in scientific notation?

(A) 5×10^4

(B) 5×10^5 $5\,000\,000$

(C) 5×10^6

(D) 5×10^7

4 $x^4\times\left(x^{10}\div x^2\right)$ equals $x^4 \times \left(\frac{x^{10}}{x^2}\right)$ $x^4 \times x^8$

(A) x^6

(B) x^{10}

(C) x^{12}

(D) x^{20}

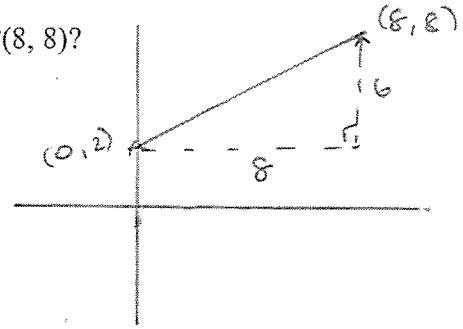
5 What is the distance between the two points $A(0, 2)$ and $B(8, 8)$?

(A) 4 units

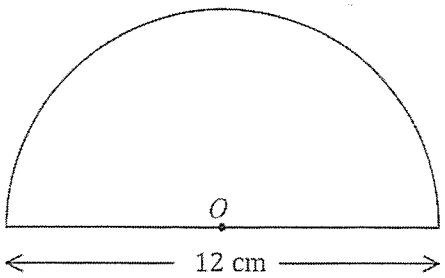
(B) 6 units

(C) 8 units

(D) 10 units



6



What is the area of the semicircle correct to two decimal places?

(A) 56.55 cm^2

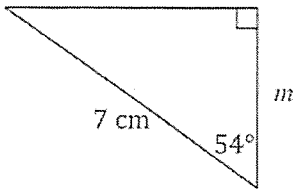
(B) 113.10 cm^2

(C) 226.19 cm^2

(D) 452.39 cm^2

$A = \frac{\pi \times 6^2}{2}$

7



Not to scale

$\cos 54 = \frac{m}{7}$

$m = 7\cos 54$

Which of the following is the correct expression for m?

(A) $m = 7\sin 54°$

(B) $m = 7\cos 54°$

(C) $m = 7\tan 54°$

(D) $m = 54\sin 7°$

8 Factorise $a^2 - a$

(A) $2(a-1)$

(B) $a(a-1)$

(C) $a(2a-1)$

(D) $a^2(a-1)$

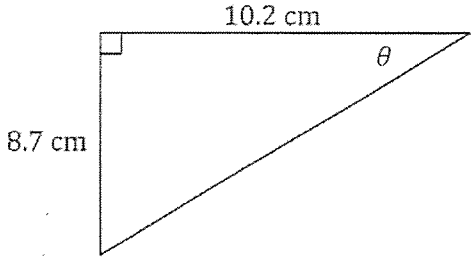
$a(a-1)$

9 A closed cylinder has a height of 12 cm and a diameter of 10 cm.
What is the surface area of the cylinder, correct to the nearest whole number?

(A) 346 cm^2
(B) 534 cm^2
(C) 1382 cm^2
(D) 1659 cm^2

$SA = 2\pi(5)(5+12)$

10



Not to scale

$\tan\theta = \frac{8.7}{10.2}$

What is the size of θ to the nearest degree?

(A) 40°
(B) 41°
(C) 50°
(D) 58°

11 $\left(6x^4y^8\right)^2$ equals

(A) $6x^6y^{10}$
(B) $6x^8y^{16}$
(C) $36x^6y^{10}$
(D) $36x^8y^{16}$

$36x^8y^{16}$

12 Which of these is the solution of $x^2+x-6=0$?

(A) $x=-1$ or $x=6$
(B) $x=1$ or $x=-6$
(C) $x=-3$ or $x=2$
(D) $x=3$ or $x=-2$

$(x+3)(x-2)=0$

$x=-3 \quad x=2$

13

Vehicle	*Automatic*	*Manual*
SUV	36	12
Sedan	48	24

48
72
84 36 120

What is the probability of choosing an automatic SUV from this group of cars?

(A) $\frac{3}{4}$

(B) $\frac{3}{7}$

(C) $\frac{2}{5}$

(D) $\frac{3}{10}$

$\frac{36}{120}$

14 What is the equation $4y-3x=12$ in gradient intercept form?

(A) $y=-\frac{3}{4}x-3$

(B) $y=-\frac{3}{4}x+3$

(C) $y=\frac{3}{4}x-3$

(D) $y=\frac{3}{4}x+3$

$4y=3x+12$

$y=\frac{3x}{4}+\frac{12}{4}$

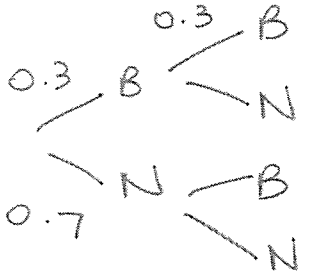
15 Beau has found the probability that his dog barks when he arrives home is 0.3. What is the probability that his dog barks on two consecutive days?

(A) 0.09

(B) 0.33

(C) 0.6

(D) 0.9



16 Which value is *not* a solution to the inequality $2x+4\leq 10$?

(A) $x=-3$

(B) $x=0$

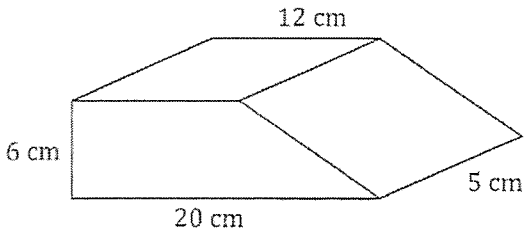
(C) $x=3$

(D) $x=4$

$2x \leq 6$

$x \leq 3$

17



Not to scale

What is the volume of the above prism?

(A) 420 cm^3

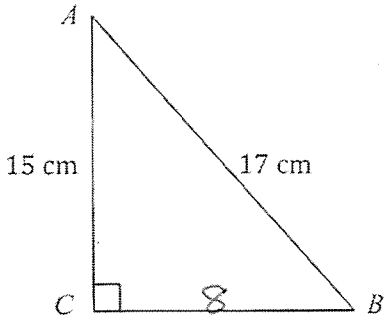
(B) 480 cm^3

(C) 960 cm^3

(D) 7200 cm^3

$V = \frac{1}{2}(6)(20+12) \times 5$

18



Not to scale

What is the area of ΔABC? Answer correct to the nearest whole number.

(A) 60 cm^2

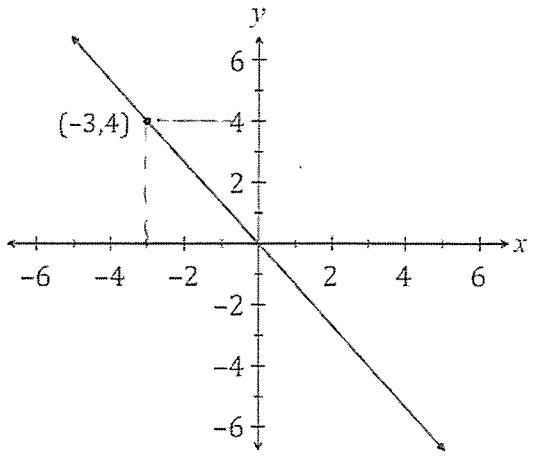
(B) 128 cm^2

(C) 225 cm^2

(D) 289 cm^2

$A = \frac{1}{2}(8)(15)$

19



Which of the following is the rule for the above line?

(A) $y=\frac{3}{4}x$

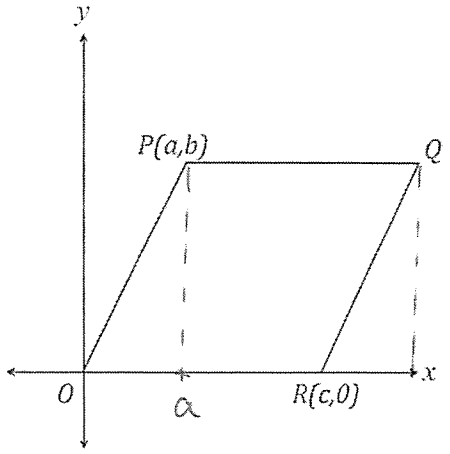
(B) $y=-\frac{3}{4}x$

(C) $y=\frac{4}{3}x$

(D) $y=-\frac{4}{3}x$

$y=-\frac{4}{3}x$

20 *OPQR* is a rhombus



Not to scale

What are the coordinates of *Q*?

(A) $(a,b+c)$

(B) $(a+c,b)$

(C) (a,b)

(D) $(a+c,b+c)$

End of Section I

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YEAR 9 MATHEMATICS

Stage 5.3

Section II **25 Marks**

Answer the questions in the spaces provided.
All necessary working should be shown in every question.

1 Simplify the following

(a) $6y \times 4y^3$ **1**

$24y^4$

(b) $3\sqrt{7}+2\sqrt{5}-6\sqrt{7}+5\sqrt{5}$ **1**

$7\sqrt{5}-3\sqrt{7}$

(c) $\dfrac{\sqrt{75}}{2\sqrt{3}}$ **1**

$\dfrac{5\sqrt{3}}{2\sqrt{3}} = \dfrac{5}{2}$

(d) $\dfrac{6x+18}{x+3}$ **1**

$\dfrac{6(x+3)}{x+3} = 6$

2 Find the coordinates of the centre of a circle, if the endpoints of its diameter are $A(-5, 5)$ and $B(7, -3)$. **1**

$\left(\dfrac{-5+7}{2}, \dfrac{5-3}{2}\right) = (1, 1)$

3 Expand and simplify:

(a) $2(x-1)+3$ **1**

$2x-2+3 = 2x+1$

(b) $(x+3)(x-4)$ **1**

$x^2 - x - 12$

(c) $(a-2)(a+2)$ **1**

$a^2 - 4$

(d) $(3+\sqrt{5})(2-\sqrt{5})$ **2**

$6 - \sqrt{5} - 5$

$1 - \sqrt{5}$

(e) $(y+3)^2 - 9$ $= (y+3)^2 - 3^2$ **2**

$[(y+3)-3][(y+3)+3]$

$y(y+6)$ or y^2+6y

4 Factorise:

(a) $3x^2 - 6x$ **1**

$3x(x-2)$

(b) $x^2 - 7x + 12$ **1**

$(x-3)(x-4)$

(c) $4x^2 - 49$ **1**

$(2x-7)(2x+7)$

(d) $2x^2 + 5x - 3$ **2**

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

5 Lucy buys a table for $600. She pays a 20% deposit upfront, and is charged 15% p.a. compound interest for two years on the balance owing. The loan is then to be repaid in monthly instalments over two years.

(a) Find the deposit paid. **1**

20% of 600 = $120

(b) Calculate the interest paid. **2**

600 − 120 = $480

$480(1.15)^2 = 634.80$

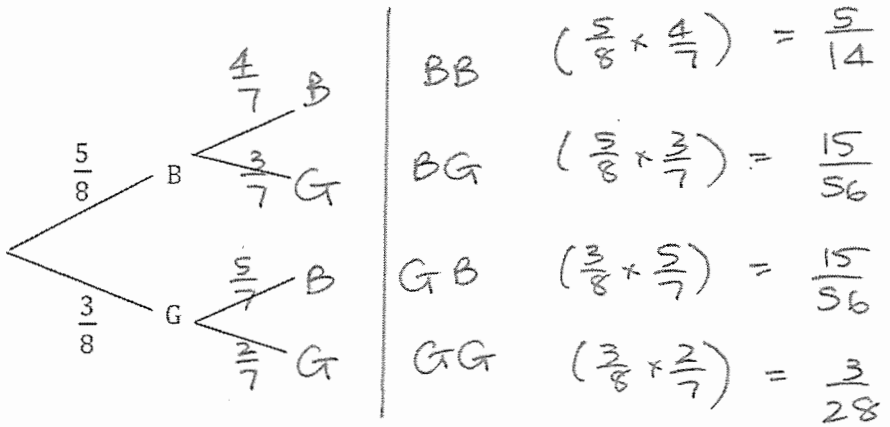
634.80 − 480 = $154.80

(c) What is the monthly repayment? **1**

634.80 ÷ 24 = $26.45

6 A bag contains five blue (B) and three green (G) counters. Two counters are selected without replacement.

(a) Complete the tree diagram below showing outcomes and probabilities. **1**



(b) Find the probability of selecting a blue counter followed by a green counter. **1**

$P(BG) = \frac{15}{56}$

(c) What is the probability of selecting exactly one blue counter? **1**

$P(BG) + P(GB) = \frac{15}{56} + \frac{15}{56}$

$= \frac{15}{28}$

(d) What is the probability of selecting at least one blue counter? **1**

$1 - P(GG) = 1 - \frac{3}{28}$

$= \frac{25}{28}$

End of Section II

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YEAR 9 MATHEMATICS

Stage 5.3

Section III **25 marks**

Answer the questions in the spaces provided.
All necessary working should be shown in every question.

1 Solve the following equations.

(a) $\frac{2y+1}{3} = -5$ **2**

$2y+1 = -15$

$2y = -16 \quad \therefore y = -8$

(b) $\frac{4a-1}{3} + a = 2$ **2**

$4a - 1 + 3a = 6$

$7a = 7 \quad \therefore a = 1$

(c) $7x = x^2$ **2**

$7x - x^2 = 0$

$x(7-x) = 0$

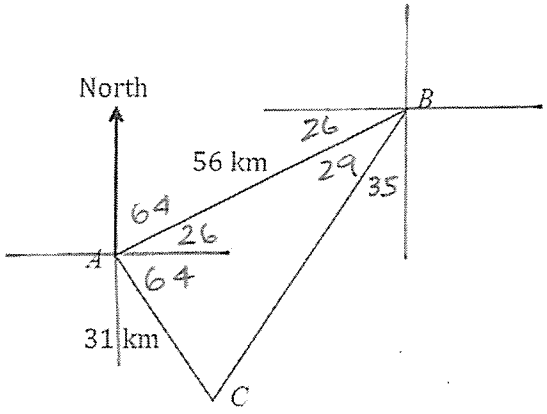
$\therefore x = 0, \; x = 7$

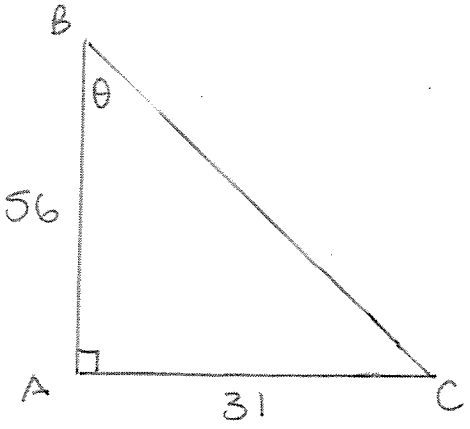
(d) $x^2 - 8x + 12 = 0$ **2**

$(x-2)(x-6) = 0$

$\therefore x = 2 \quad x = 6$

2 B is 56 km from A on a bearing of 064°. C is 31 km from A on a bearing of 154°.





(a) Find the size of $\angle BAC$. **1**

90°

(b) Find the bearing of A from B. **1**

244°

(c) Find the size of $\angle ABC$. Answer to the nearest degree. **1**

$\tan \angle ABC = \frac{31}{56}$

$= 29°$

(d) Find the bearing of C from B. **1**

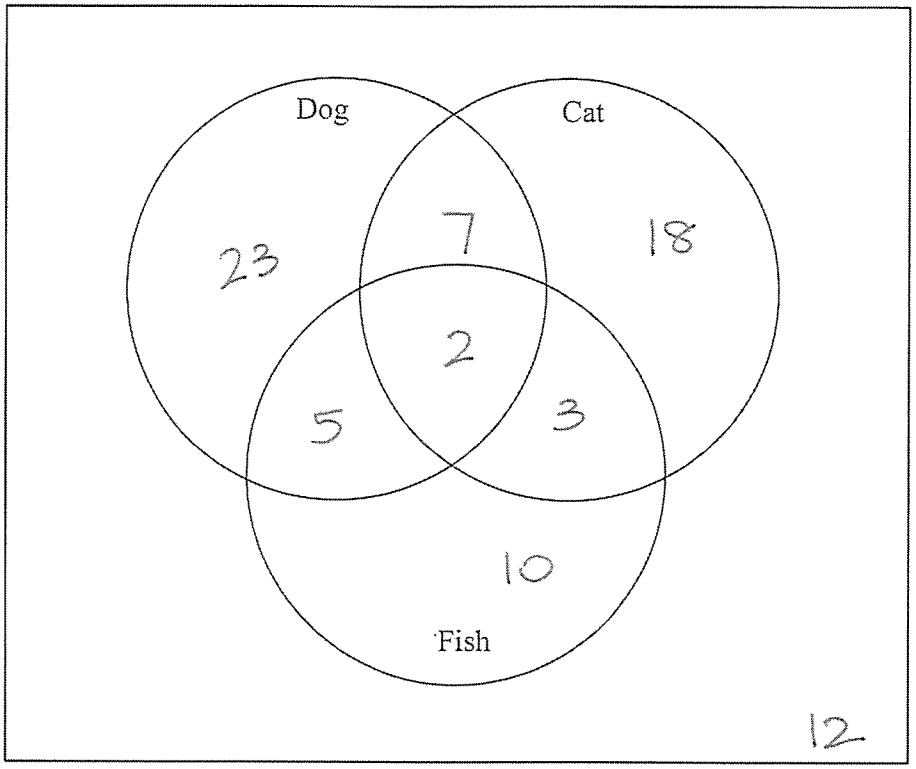
215°

(e) Find the distance from C to B. **1**

64 km

3 The Venn diagram shows the pets owned by a group of 80 people. 37 have a dog, 30 have a cat and 20 have a fish. 9 own both a cat and a dog, 5 have a cat and a fish, 7 have a dog and a fish while 2 people own all three pets.

Complete the Venn diagram below showing pet ownership by this group. **1**



A person is selected at random from this group.

(a) What is the probability that the person selected owns a dog? **1**

$\frac{37}{80}$

(b) What is the probability that the person selected owns only a dog? **1**

$\frac{23}{80}$

(c) What is the probability that the person selected owns at least two pets? **1**

$\frac{17}{80}$

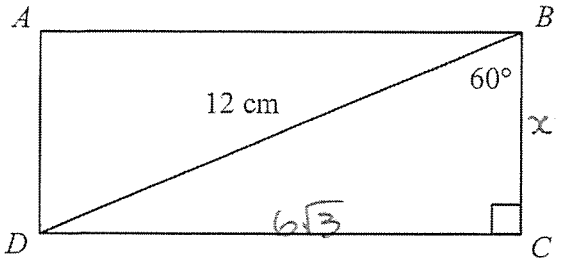
(d) Given that the selected person owns a dog, what is the probability they also own a cat? **1**

$\frac{9}{37}$

(e) Given that the selected person owns a pet, what is the probability they own only a cat? **1**

$\frac{18}{68} = \frac{9}{34}$

4 Find the exact perimeter of rectangle ABCD below. **3**



NOT TO SCALE

$\cos 60 = \frac{x}{12}$

$x = 6$

$\therefore (DC)^2 = 12^2 - 6^2$

$(DC)^2 = 108$

$DC = \sqrt{108}$

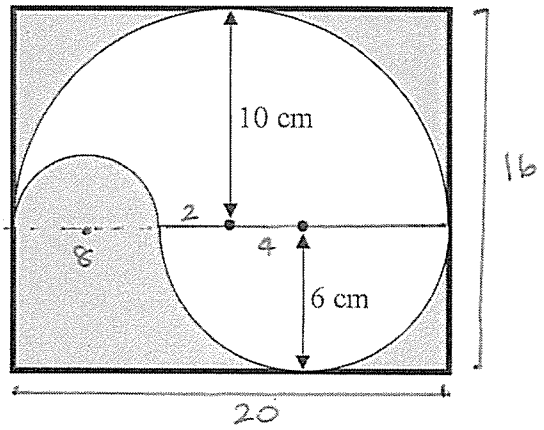
$DC = 6\sqrt{3}$

$\therefore P = 12 + 12\sqrt{3}$

or

$P = 12(1+\sqrt{3})$ cm

5 Find the area of the shaded region to 3 significant figures. **3**



NOT TO SCALE

$(20 \times 16) - \left[\frac{\pi \times 6^2}{2} + \frac{\pi \times 10^2}{2} - \frac{\pi \times 4^2}{2}\right]$

$320 - (188.495\ldots)$

131.5044

$132\ \text{cm}^2$

End of Examination