

Name: _____

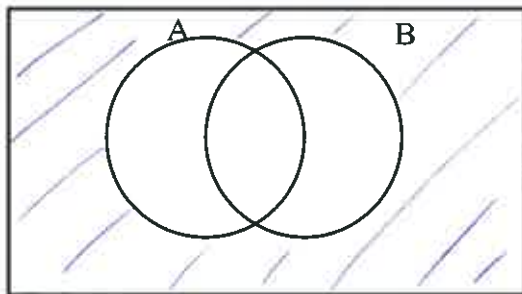
Resource Free

ALL working must be shown for full marks.

1. (1, 1 = 2 marks)

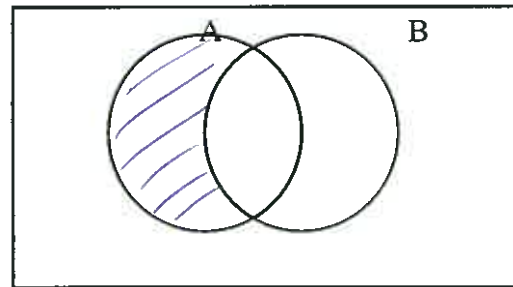
Shade the area indicated

a) $\overline{A \cup B}$



✓

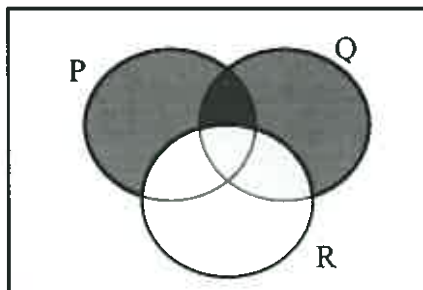
b) $A \cap \bar{B}$



✓

2. (2 marks)

Use set notation to describe the shaded region represented in the Venn diagram below:



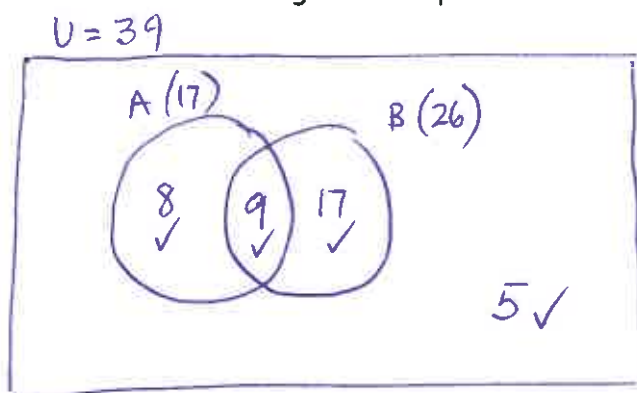
$(P \cup Q) \cap \bar{R}$

✓ ✓

3. (4, 6 = 10 marks)

Sets A and B are such that $n(A) = 17$, $n(B) = 26$ and $n(A \cup B) = 34$. If $n(U) = 39$:

a) Construct a Venn Diagram to represent these sets



b) Determine:

(Follow throughs available)

- i $n(A|B)$ 9 ✓
- ii $n(A \cap B)'$ 30 ✓
- iii $n(B|A')$ 17 ✓
- iv $n(A' \cup B')$ 30 ✓
- v $n(A' \cap B')$ 5 ✓
- vi $n(A \cap B)'$ 31 ✓

4. [2, 2, 2 = 6 marks]

Find the equations of the circles determined by the following conditions (use form $x^2 + y^2 = a^2$)

a) centre (0, 0), radius 5

$$x^2 + y^2 = 5^2 \text{ or } 25$$

b) centre (0, 0), $r = \sqrt{5}$

$$x^2 + y^2 = 5$$

c) centre (-4, -3), radius $\sqrt{3}$

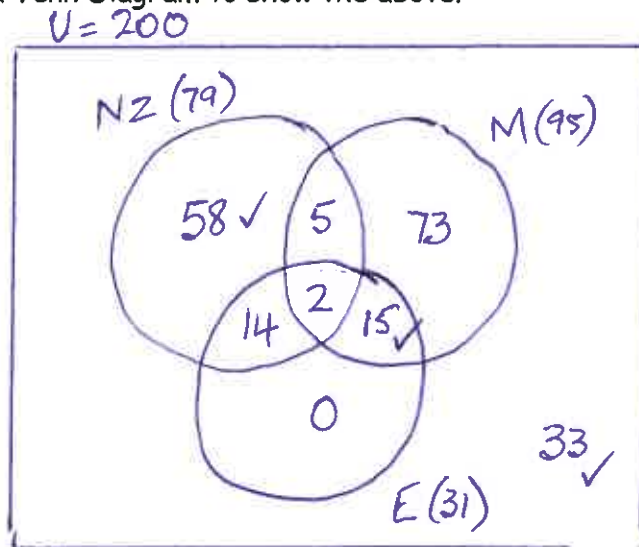
$$(x+4)^2 + (y+3)^2 = 3$$

5. (3, 1, 1, 1, 1 = 7 marks)

Two hundred people were asked the question, 'Which overseas destination have you visited' and their responses were as follows:

Seventy nine said they had visited New Zealand and 95 had visited Malaysia. Two had visited all three places, sixteen had visited New Zealand and Europe, and 7 had visited New Zealand and Malaysia and. Seventy three had only visited Malaysia and 31 people said they had visited Europe.

a) Draw a Venn Diagram to show the above.



(Follow through available from this point on)

b) For how many people was Europe their only overseas destination?

0 ✓

c) How many people had visited Europe and Malaysia?

17 ✓

d) How many people had visited none of these places?

33 ✓

e) How many people had visited exactly two of these places?

$14 + 5 + 15$
 $= 34$ ✓

6. [3 marks]

The points $(-2, 5)$, $(3, k)$ and $(5, 12)$ are collinear. Find the value(s) of k .

For points $(-2, 5)$ to $(5, 12)$

$$m = \frac{12-5}{5-(-2)} \quad \checkmark$$

$$= \frac{7}{7}$$

so $1 \quad \checkmark$

so for $(-2, 5)$ $y = x + 7$
also for $(5, 12)$

so $(3, k)$ becomes $(3, 10)$

$$K = 10 \quad \checkmark$$

7. ⁶
[3 marks]

Which of the following are NOT circles? Circle your choice.

a) $x^2 + y^2 - 4x + 2y = 8$

Circle / Not circle \checkmark

b) $x^2 + y^2 = 9$

Circle / Not circle \checkmark

c) $x^2 + y^2 + 100 = 0$

Circle / Not circle \checkmark

d) $x^2 + 2y^2 + 2x - 4y = 4$

Circle / Not circle \checkmark

e) $2x^2 + 2y^2 = 50$

Circle / Not circle \checkmark

f) $x^2 + y^2 - 3xy = 20$

Circle / Not circle \checkmark

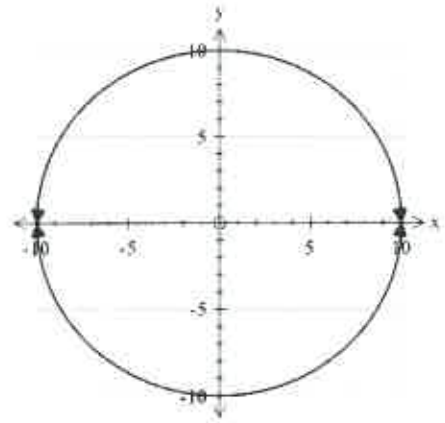
8. [2, 2, 2 = 6 marks]

State the equation of each of the relationships.

a)

$$x^2 + y^2 = 10^2 \quad (\text{or } 100)$$

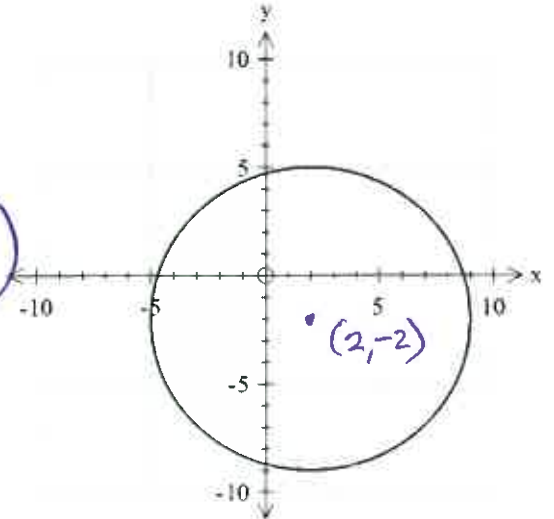
✓ ✓



b)

$$(x-2)^2 + (y+2)^2 = 7^2 \quad (\text{or } 49)$$

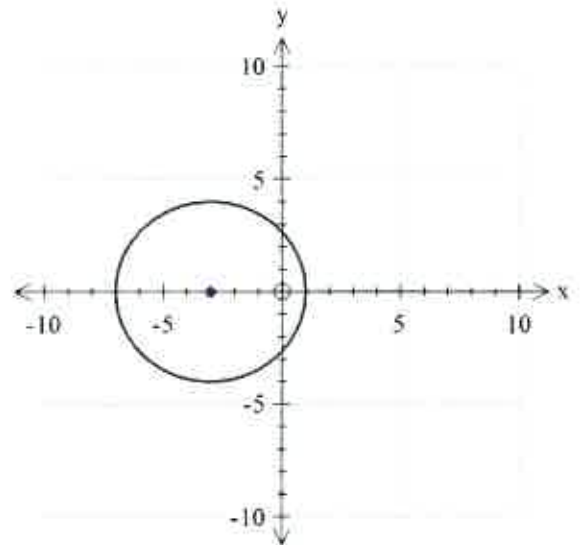
✓ ✓



c)

$$(x+3)^2 + y^2 = 4^2 \quad (\text{or } 16)$$

✓ ✓



9. (3 marks)

Are the following events complementary? Answer "Complementary" OR "Not Complementary".

- a) Event A: Rolling a number greater than 4 on a die.
Event B: Rolling a number less than 4 on a die.

Not complementary ✓ (4 not included in A or B)

- b) Event A: Guessing a Prime number from the set A when $A = \{\text{whole numbers less than 20}\}$
Event B: Guessing a Composite number from a set A when $A = \{\text{whole numbers less than 20}\}$

Not complementary ✓ (1 not included in A or B)

- c) Event A: Picking a vowel from the alphabet.
Event B: Picking a consonant from the alphabet.

Complementary ✓

10. [2, ~~2~~, 4 = 8 marks]

For the circle, $x^2 + y^2 + 6x - 14y = 6$ find:

- a) the coordinates of the centre

$$(x+3)^2 + (y-7)^2 = 6 + 9 + 49 \\ = 64 \quad \checkmark$$

$$\text{so centre} = (-3, 7) \quad \checkmark$$

- b) the radius

$$\sqrt{64} = 8 \quad \checkmark$$

- c) the exact coordinates of the intercepts.

When $x = 0$

$$(y-7)^2 = 6 + 49 \\ = 55$$

$$\therefore y = \pm\sqrt{55} + 7$$

$$\text{so } (0, 7 + \sqrt{55}) \quad \checkmark \\ (0, 7 - \sqrt{55}) \quad \checkmark$$

When $y = 0$

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

$$\text{so } (x+3)^2 = 6 + 9 \\ = 15$$

$$\therefore x = \pm\sqrt{15} - 3$$

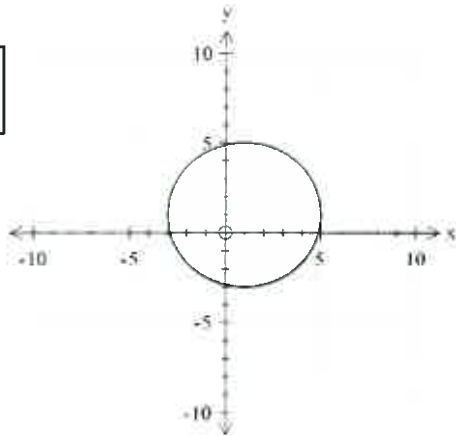
$$\text{so } (\sqrt{15} - 3, 0) \quad \checkmark \\ (-\sqrt{15} - 3, 0) \quad \checkmark$$

(-1 notation if coordinates not given)

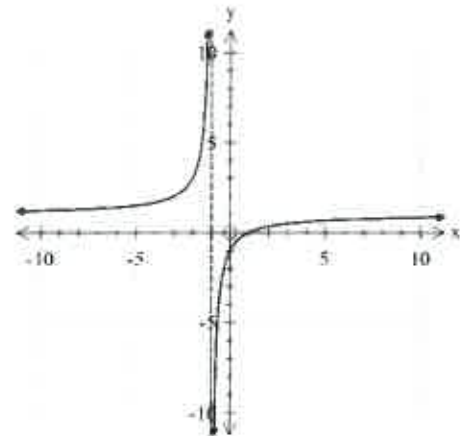
11. [6 marks]

Match the given equations to the correct graph.

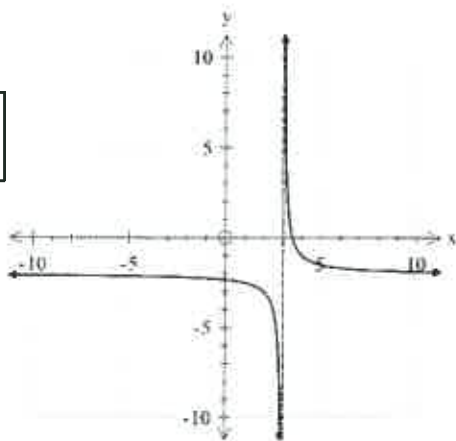
Graph A



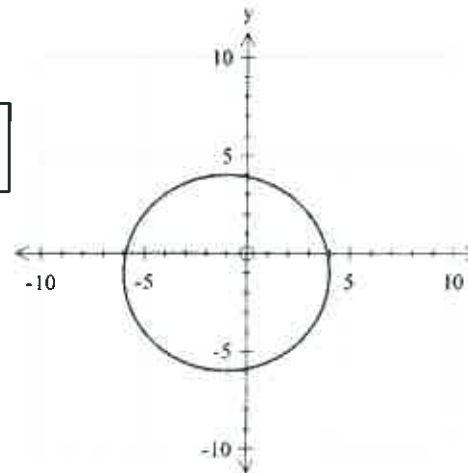
Graph B



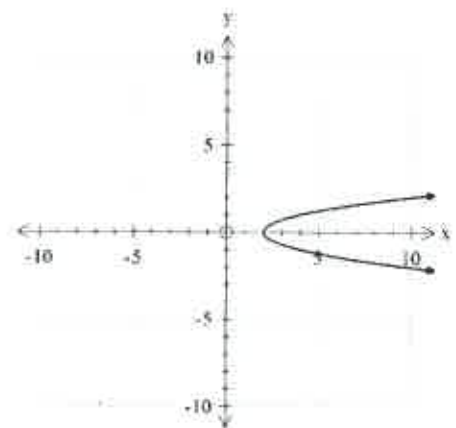
Graph C



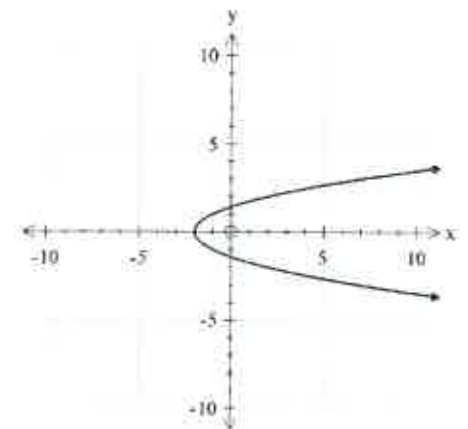
Graph D



Graph E



Graph F



$y^2 - 2 = x$ Graph: F ✓

$y = \frac{1}{x-3} + 2$ Graph: C ✓

$(x+1)^2 + (y+1)^2 = 25$ Graph: D ✓

$2y^2 + 2 = x$ Graph: E ✓

$y = \frac{-2}{x+1} + 1$ Graph: B ✓

$(x-1)^2 + (y-1)^2 = 16$ Graph: A ✓