868

TUTORS

Math

Preparation for

High School Mathematics

Sets

Solutions

Student Name: _____

Student ID: _____

Date: _ _ / _ _ / _ _ _ _

Total Score:

Highest Score:

Tutor's Comments:

Question 1

The Venn diagram below illustrates the number of students who drink juice (J) or carbonated beverages (C) during lunch time in a school of 500 students.

U

J   C

$3x$ x 40

60
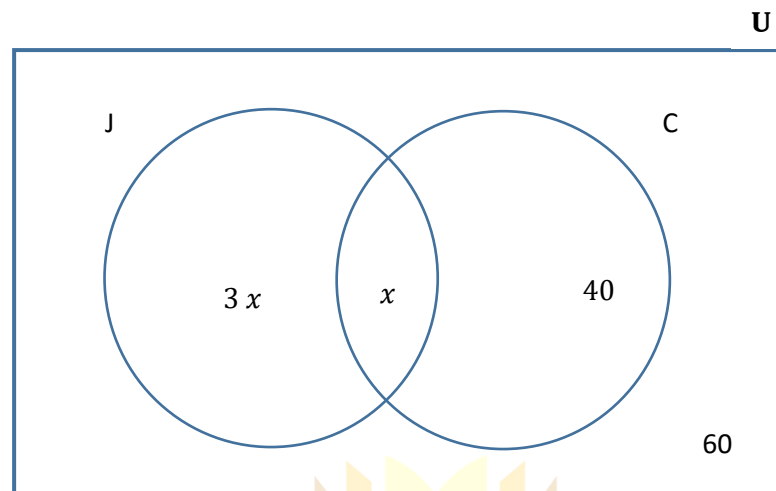
(a) How many students drink neither Juice nor Carbonated beverages during lunch time?

From Venn diagram

n (J ∪ C)′ = 60

| **60 students drink neither Juice nor Carbonated beverages during lunch time** |

(1 mark)

(b) Write an expression, in terms of x , which represents the TOTAL number of students in the school.

| $3x + x + 40 + 60$ |

(1 mark)

(c) Write an equation which may be used to determine the total number of students who drink both juice and carbonated beverages during lunch time.

We need an equation in terms of x

$$3x + x + 40 + 60 = 500$$
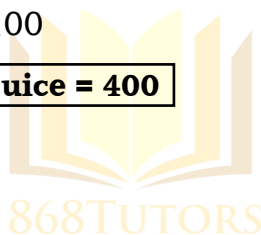
(1 mark)

(d) How many students drink juice?

Students that drink juice= Students that drink juice only + students that drink both juice and carbonated beverages

Number of students that drink juice = $3x + x = 4x$

Recall $3x + x + 40 + 60 = 500$ (c)

$4x = 500 - 100$, $4x = 400$, $x = 100$

Number of students that drink juice = 400

(1 mark)

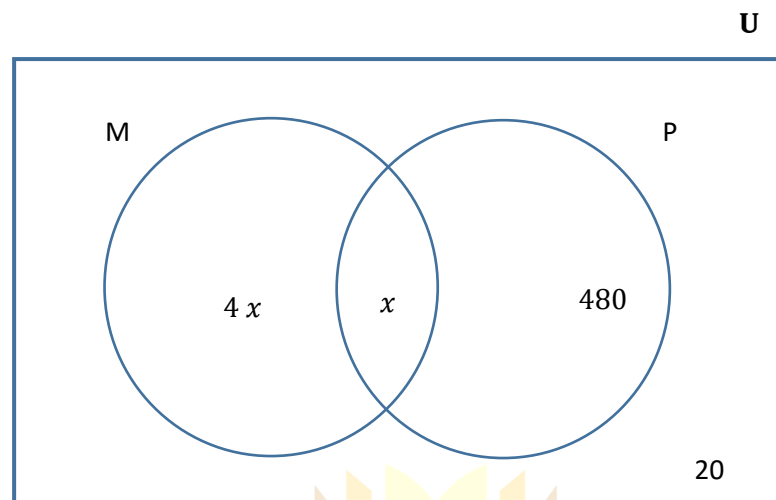**(e) How many students drink carbonated beverages only?**

From Venn diagram

Number of students that drink carbonated beverages only = 40

(1 mark)

Question 2

The Venn diagram below illustrates the number of people who make their own ice-cream (M) or purchase ice-cream (P) in a town of 1000 people.

U

M

P

$4x$

x

480

20

(a) How many people in the town neither make their own ice-cream nor purchase ice-cream?

From Venn diagram

n $(M \cup P)' = 20$

20 people in the town neither make their own ice-cream nor purchase ice-cream

(1 mark)

(b) Write an expression, in terms of x , which represents the TOTAL number of people in the town.

$4x + x + 480 + 20$

(1 mark)

(c) Write an equation which may be used to determine the total number of people in the town who make their own ice-cream and purchase ice-cream.

We need an equation in terms of x

$4x + x + 480 + 20 = 1000$

(1 mark)

(d) How many people in the town make their own ice-cream?

People who make their own ice-cream = People who make ice-cream only + People who make ice-cream and purchase ice-cream

People who make their own ice-cream = $4x + x = 5x$

Recall from (c) $4x + x + 480 + 20 = 1000$

$5x + 500 = 1000$, x = 100

$5x = 500$ **500 people make their own ice-cream**

(1 mark)

(e) How many people in the town purchase ice-cream only?

From the Venn Diagram

Number of people in town who purchase ice cream only = 480

(1 mark)

Question 3

In a town of 50 households,

30 households own pickup trucks,

3y students own compact cars only

y households own both compact cars and pickup trucks

2 households own neither compact cars nor pickup trucks

(a) Draw and clearly label a Venn diagram to illustrate the aforementioned information

n **(U) = 50**
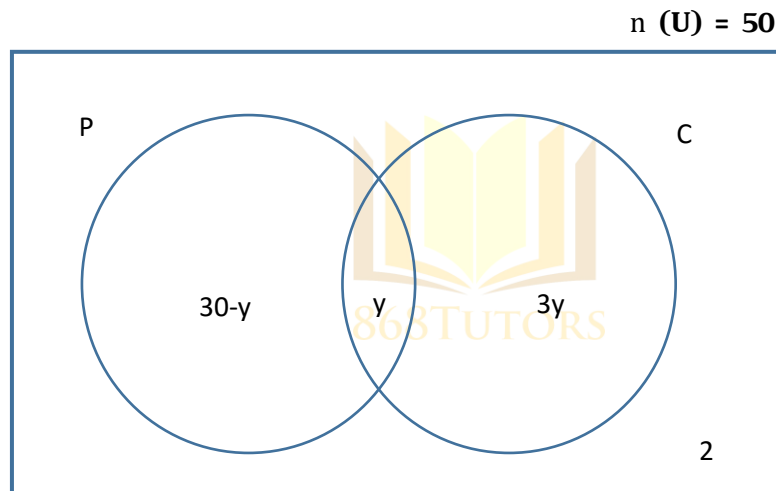
Let P represent Pickup trucks

Let C represent Compact Cars

P · 30-y · y · 3y · C · 2

(3 marks)

(b) Calculate the number of households that own compact cars

Owners of compact cars = owners of compact cars only + owners of compact cars and pickup trucks

Owners of compact cars = 3y +y = 4y

We need to write an equation in terms of y and solve for y

30-y + y + 3y + 2 = 50, 3y + 32 = 50, 3y = 18, y = 6

4y = 24, **24 households own compact cars**

(2 marks)

(c) Calculate the number of households that own pickup trucks only

From the Venn diagram

Number of households that own pickup trucks only = 30 - y

From (b) y = 6

30 - 6 = 24

24 households own pickup trucks only

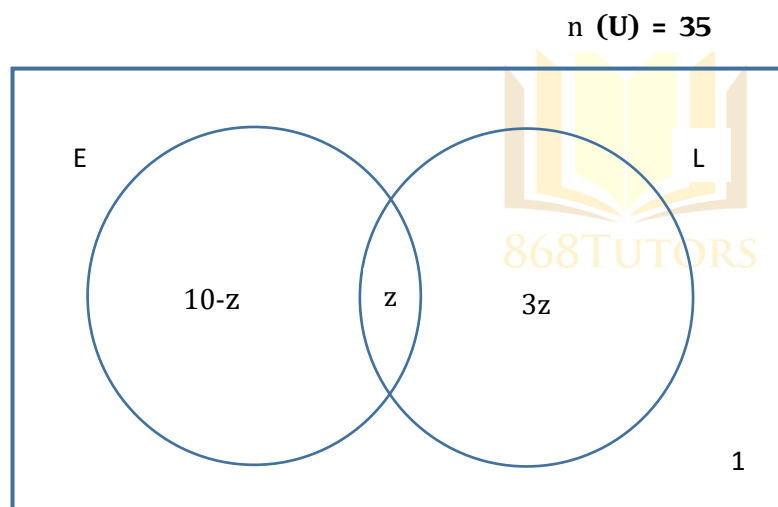**(2 marks)**

Question 4

In a class of 35 students,

10 students have visited the Erin mud volcanoes

3z students have visited the La Brea Pitch Lake only

z students have visited both the Erin mud volcanoes and the La Brea Pitch Lake

1 person has visited neither the Erin Mud Volcanoes nor the La Brea Pitch Lake

(a) Draw and clearly label a Venn diagram to illustrate the aforementioned information

n (U) = 35

Let E represent visitors to the Erin Mud Volcanoes

Let L represent visitors to the La Brea Pitch Lake

E   10-z   z   3z   L

1

(2 marks)

(b) Calculate the number of students that have visited the La Brea Pitch Lake

Visitors to the La Brea Pitch Lake = Visitors to the La Brea Pitch Lake only + Visitors to the La Brea Pitch Lake and the Erin Mud Volcanoes

Visitors to the La Brea Pitch Lake = $3z + z = 4z$

We need to write an equation in terms of z ($10-z + z + 3z + 1 = 35$)

$3z + 11 = 35$

$3z = 35-11$ $3z = 24$ $z = 8$ (Therefore, $4z = 32$)

32 students have visited the La Brea Pitch Lake

(2 marks)

(c) Calculate the number of students that have visited the Erin mud volcanoes only

From the Venn diagram

Number of students that have visited the Erin Mud Volcanoes only = 10 - z

Recall from (b) z = 8

Number of students that have visited the Erin Mud Volcanoes only = 10 - 8 = 2

2 students have visited the Erin Mud Volcanoes only

(2 marks)

Question 5

The universal set, U is defined as:

_U = {10,11,12,13,14,15,16,17,18,19,20}_

X and Y are subsets of U, such that:

X = {even numbers}

Y = {odd numbers}

(a) List the members of the set X
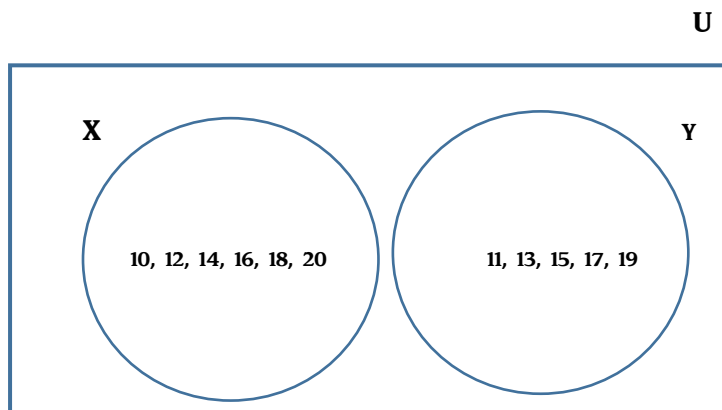
X = {10, 12, 14, 16, 18, 20}

(1 mark)

(b) List the members of the set Y

Y = {11, 13, 15, 17, 19,}

(1 mark)

Draw a Venn diagram to represent the sets X, Y and U

(c)

U

X   Y
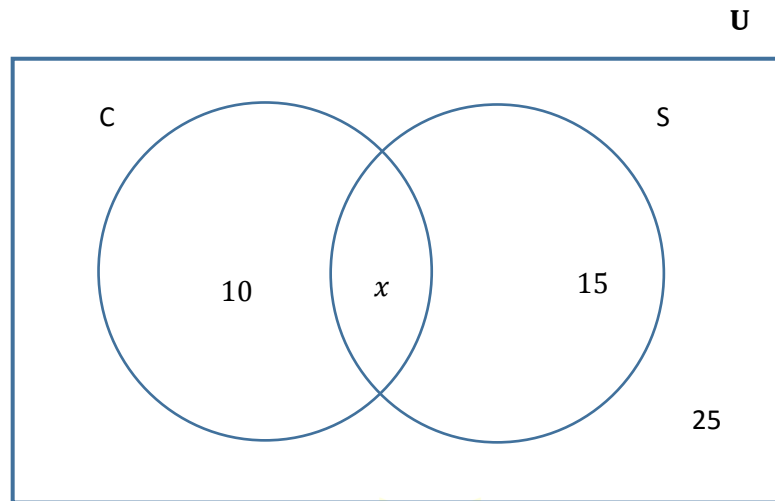
10, 12, 14, 16, 18, 20   11, 13, 15, 17, 19

(3 marks)

Question 6

The Venn diagram below illustrates the number of people who drink coconut water (C) or spring water (S) in a village of 100 people.

(a) How many people in the village drink neither coconut water nor spring water?

$n\left(C \cup S\right)' = 25$

25 people in the village drink neither coconut water nor spring water

(1 mark)

(b) Write an expression, in terms of x, which represents the total number of people in the village.

$10 + x + 15 + 25$

(1 mark)

(c) Write an equation which may be used to determine the total number of people in the village who drink coconut water and spring water.

$10 + x + 15 + 25 = 100$

(1 mark)

(d) How many people in the village drink coconut water?

People who drink coconut water = People who drink coconut water only + People who drink coconut water and spring water

People who drink coconut water = $10 + x$

We need to write an equation in terms of x and solve for x

$10 + x + 15 + 25 = 100$

$x + 50 = 100, x = 100 - 50 \;\; , x = 50$

Therefore, 10 + x, 60 people drink coconut water

(1 mark)

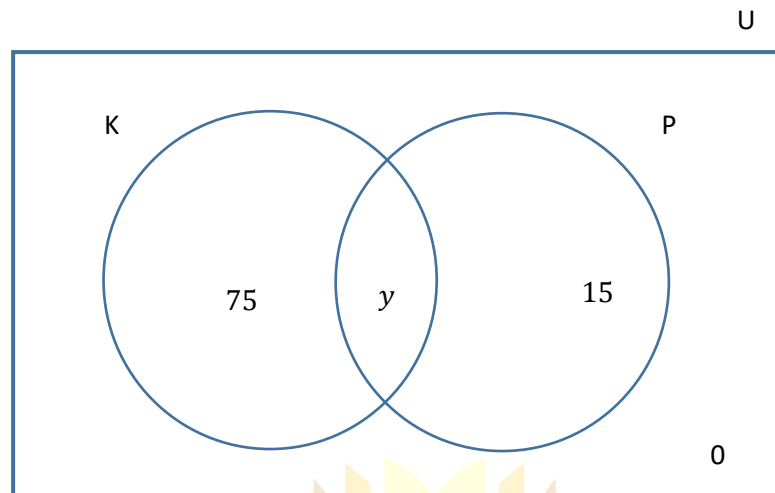**(e) How many people in the village drink spring water only?**

From the Venn diagram

15 people drink spring water only

(1 mark)

Question 7

The Venn diagram below illustrates the number of people who plant vegetables (K) and those who purchase vegetables (P) in a community of 120 people.

U

K   P

75   y 15

0

(a) How many people in the community neither plant their own vegetables nor purchase vegetables?

From the Venn diagram

$n\left(K \cup P\right)' = 0$

| 0 people in the community neither plant their own vegetables nor purchase vegetables |

(1 mark)

(b) Write an expression, in terms of y, which represents the total number of people in the village.

75 + y + 15 + 0

| 75 + y + 15 |

(1 mark)

(c) Write an equation which may be used to determine the total number of people in the village who plant vegetables and purchase vegetables.

$\boxed{75 + y + 15 = 120}$

(1 mark)

(d) Write an expression in y for the number of people who plant their own vegetables

People who plant their own vegetables = People who plant their own vegetables only + People who plant vegetables and purchase vegetables

$\boxed{\textbf{People who plant their own vegetables = 75 + y}}$

(1 mark)

(e) How many people in the village purchase vegetables only?

From the Venn diagram

$\boxed{\textbf{15 people purchase vegetables only}}$

(1 mark)

END OF WORKSHEET