

Welcome MYP 9 Mathematics!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 5-21 Topic: 3E.1 & 3E.2 Venn Diagrams	0 1 2	
Tuesday Date: 5-22 Topic: Venn Diagrams Day 2	0 1 2	
Wednesday Date: _____ Topic: _____	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Class Plan

1) Warm-up (Tennis vs. Netball Ex)

2) Real-life Venn Diagrams

14

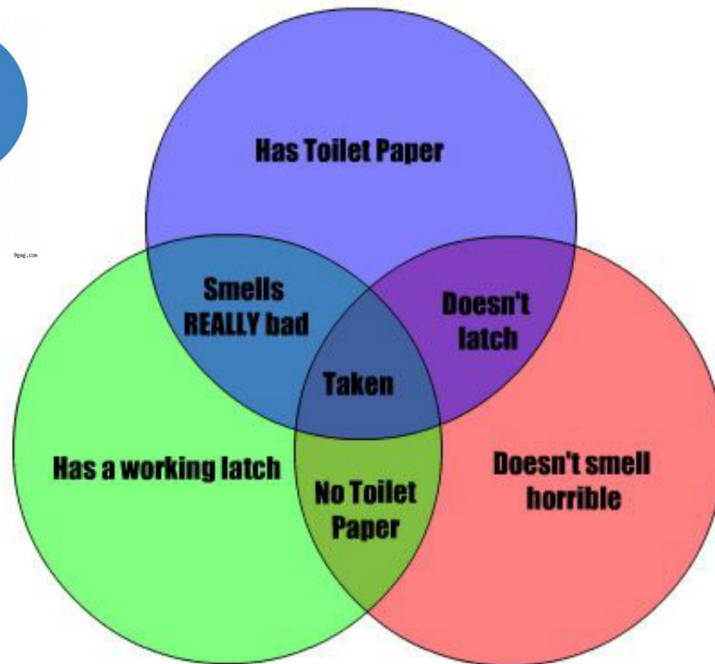
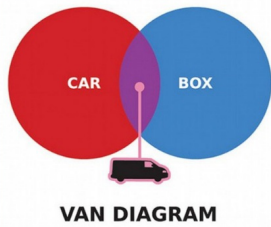
I

PROBABILITIES FROM VENN DIAGRAMS

In **Chapter 3** we studied **Venn diagrams**. We saw that they consist of a rectangle which represents the universal set, and circles within it which represent subsets. In probability questions, the circles in a Venn diagram are used to represent particular events.

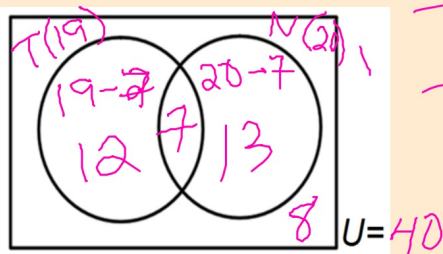
3) Practice

Jokes :) The School Bathroom Paradox



Tennis & Netball

- 4 In a class of 40 students, 19 play tennis, 20 play netball, and 8 play neither of these sports. A student is randomly chosen from the class. Determine the probability that the student:
- a plays tennis
 - b does not play netball
 - c plays at least one of the two sports
 - d plays exactly one of the sports
 - e plays netball, given that they do not play tennis.



$$T \cup N = 40 - 8 = 32$$
$$T \cap N = 7$$

14I Venn Diagram Applications

DO: Venn Diagrams Day 3 Examples

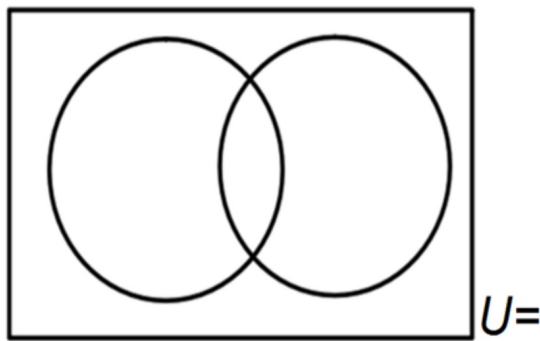
***Write notation with probability questions



Done? Get handout up front
(We will come back together to
go through Mailbox problem)

Numbers in a Bag (1 to 25)

- 1 The numbers from 1 to 25 are placed in a bag, and one number is selected at random. Let A represent selecting a multiple of 3, and B represent selecting a multiple of 4.
- a Represent A and B on a Venn diagram.
 - b Find the probability of selecting:
 - i a multiple of 3
 - ii a multiple of 3 *and* 4
 - iii a multiple of 4, but not a multiple of 3
 - iv a multiple of 3 or 4, but not both.



Numbers in a Bag (1 to 25)

1 The numbers from 1 to 25 are placed in a bag, and one number is selected at random. Let A represent selecting a multiple of 3, and B represent selecting a multiple of 4.

a Represent A and B on a Venn diagram.

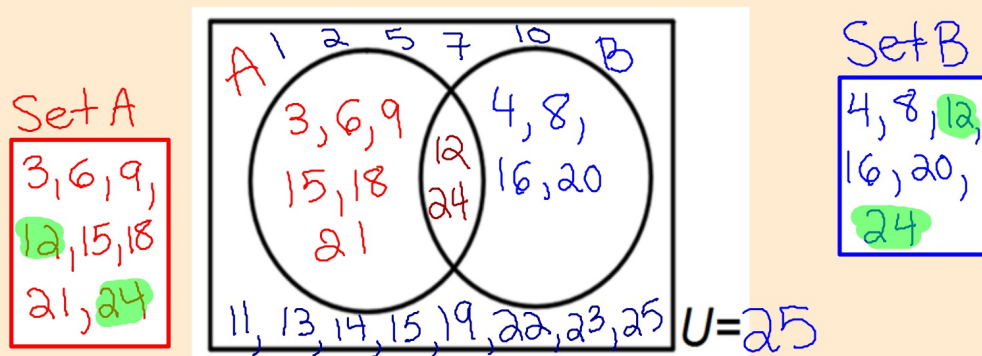
b Find the probability of selecting:

i a multiple of 3

ii a multiple of 3 and 4

iii a multiple of 4, but not a multiple of 3

iv a multiple of 3 or 4, but not both.



Numbers in a Bag (1 to 25)

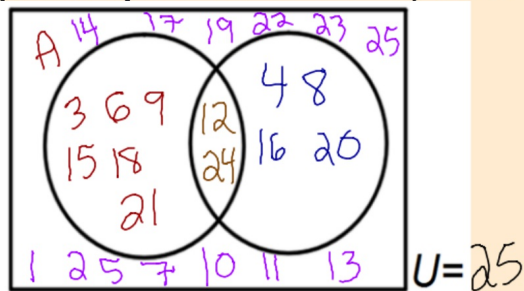
Probability Questions: Challenge yourself to use the set notation for each question.

$$P(\text{Multiple of 3}) = \frac{6}{25} \quad P(A)$$

$$P(\text{Multiple of 3 AND 4}) = \frac{2}{25} \quad P(A \cap B)$$

$$P(\text{Multiple of 4, but not 3}) = \frac{4}{25} \quad P(A' \cap B)$$

$$P(\text{Multiple of 3 or 4, not both}) = \frac{10}{25} = \frac{2}{5} \quad P(A \cap B)'$$



Numbers in a Bag (1 to 25)

1 The numbers from 1 to 25 are placed in a bag, and one number is selected at random. Let A represent selecting a multiple of 3, and B represent selecting a multiple of 4.

a Represent A and B on a Venn diagram.

b Find the probability of selecting:

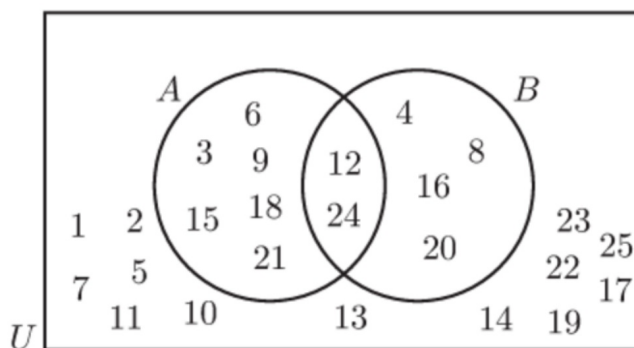
i a multiple of 3

ii a multiple of 3 and 4

iii a multiple of 4, but not a multiple of 3

iv a multiple of 3 or 4, but not both.

1 a



b

i $\frac{8}{25}$

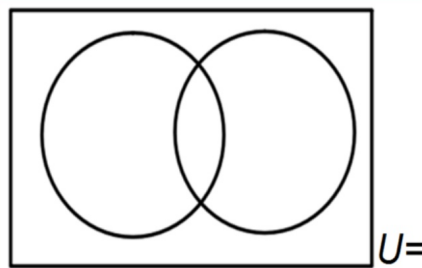
ii $\frac{2}{25}$

iii $\frac{4}{25}$

iv $\frac{2}{5}$

Physics & Chemistry

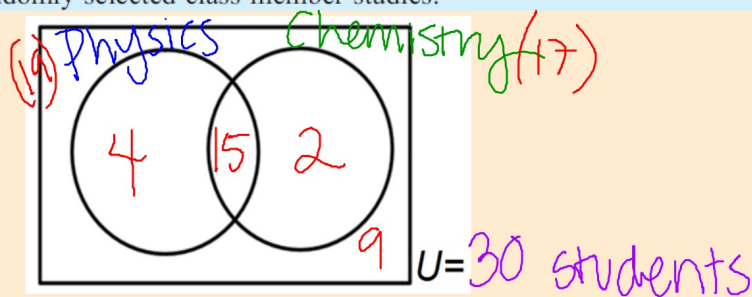
In a class of 30 students, 19 study Physics, 17 study Chemistry, and 15 study both of these subjects. Display this information on a Venn diagram and hence determine the probability that a randomly selected class member studies:



- a** both subjects
- b** at least one of the subjects
- c** Physics but not Chemistry
- d** exactly one of the subjects
- e** neither subject
- f** Chemistry if it is known that the student studies Physics.

Physics & Chemistry

In a class of 30 students, 19 study Physics, 17 study Chemistry, and 15 study both of these subjects. Display this information on a Venn diagram and hence determine the probability that a randomly selected class member studies:



a both subjects

$$P(P \cap C) = \frac{15}{30} = \frac{1}{2}$$

b at least one of the subjects

$$P(P \cup C) = \frac{21}{30}$$

c Physics but not Chemistry

$$P(P \cap C') = \frac{4}{30} = \frac{2}{15}$$

d exactly one of the subjects

$$P((P \cap C') \cup (C \cap P')) = \frac{6}{30} = \frac{1}{5}$$

e neither subject

$$P((P \cup C)') = \frac{9}{30} = \frac{3}{10}$$

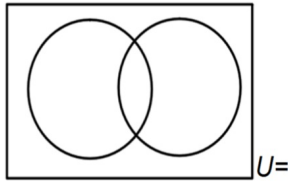
f Chemistry if it is known that the student studies Physics

$$P(C | P) = \frac{15}{19}$$

Warm-up: Badminton

3) A badminton club has 31 playing members. 28 play singles and 16 play doubles.

i) Create a Venn diagram.



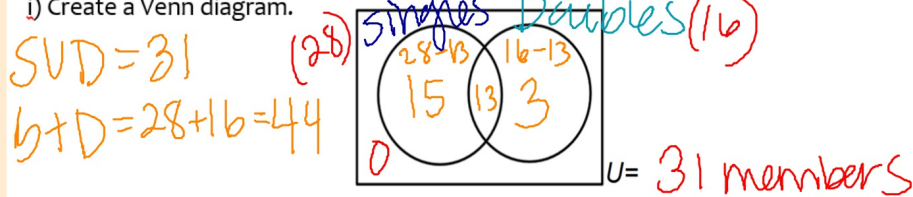
ii) How many play both singles and doubles?

iii) What's the probability that a player randomly selected has played doubles, but no singles?

Warm-up: Badminton

3) A badminton club has 31 playing members. 28 play singles and 16 play doubles.

i) Create a Venn diagram.



ii) How many play both singles and doubles?

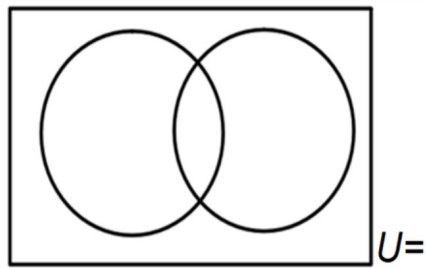
$$P(S \cap D) = \frac{13}{31}$$

iii) What's the probability that a player randomly selected has played doubles, but no singles?

$$P(D \cap S') = \frac{3}{31}$$

Measles & Mumps

- 5 The medical records for a class of 30 children show whether they have previously had measles or mumps. 24 have had measles, 12 have had measles *and* mumps, and 26 have had measles *or* mumps. If one child from the class is selected at random, determine the probability that he or she has had:
- a mumps
 - b mumps but not measles
 - c neither mumps nor measles.



a) mumps

b) mumps but not measles

c) neither mumps nor measles

Measles & Mumps

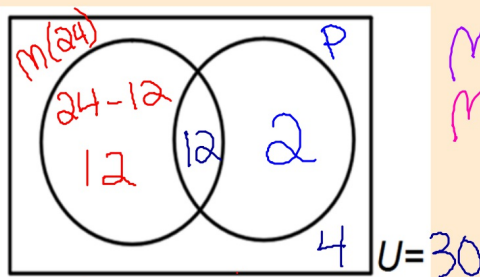
5 The medical records for a class of 30 children show whether they have previously had measles or mumps. 24 have had measles, 12 have had measles *and* mumps, and 26 have had measles *or* mumps. If one child from the class is selected at random, determine the probability that he or she has had:

a mumps

b mumps but not measles

c neither mumps nor measles.

M: Measles P: Mumps



$$M \cap P = 12$$

$$M \cup P = 26$$

$$\text{Mumps only} \\ 26 - 24 = 2$$

$$30 - M \cup P = (M \cup P)'$$

$$(M \cup P)' = 4$$

a) mumps $P(P) = \frac{14}{30} = \frac{7}{15}$

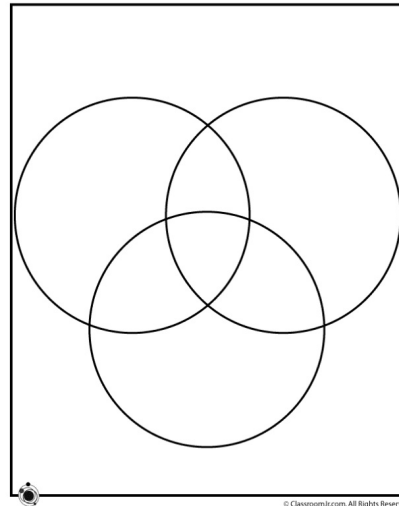
b) mumps but not measles $P(M \cap P') = \frac{2}{30} = \frac{1}{15}$

c) neither mumps nor measles

$$P((M \cup P)') = \frac{4}{30} = \frac{2}{15}$$

Mailbox

- 6 Neville checked his letter box each day for 80 days. He received letters on 40 days, bills on 14 days, and junk mail on 41 days. He received letters *and* bills on 9 days, and bills *and* junk mail on 7 days. He received all three items on 4 days, and no items on 14 days.



Mailbox

Neville checked his letter box each day for 80 days. He received letters on 40 days, bills on 14 days, and junk mail on 41 days.

He received...

letters AND bills on 9 days,

bills AND junk mail on 7 days,

all three items on 4 days

no items on 14 days

$$L \cap B = 9$$

$$B \cap J = 7$$

$$(L \cup B \cup J) = 4$$

$$L \cup J = 64$$

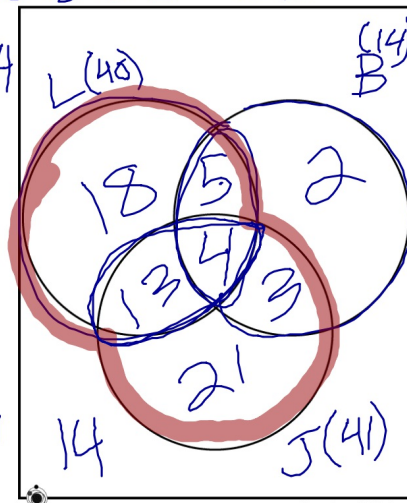
$$L = 40 \quad B = 14 \quad J = 41$$



$$80 = U$$

$$L \cap B \cap J = 4$$

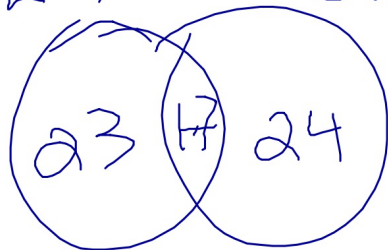
$$L \cup B \cup J = 4$$



L(40)

J(41)

$L \cup J = 64$



$$40 + 41 - 64 = 17$$

$$81 - 64 = 17$$

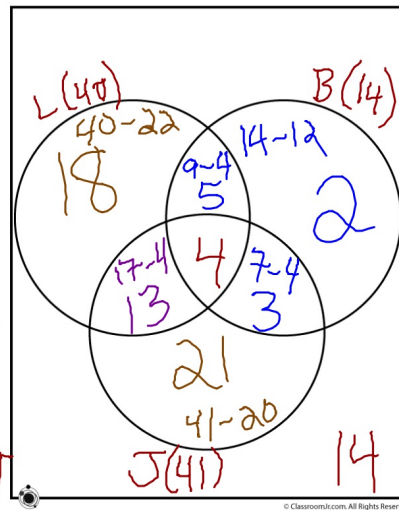
Mailbox

Neville checked his letter box each day for 80 days. He received letters on 40 days, bills on 14 days, and junk mail on 41 days. He received...

letters AND bills on 9 days,
bills AND junk mail on 7 days,
all three items on 4 days
no items on 14 days

$$\begin{aligned}
 L=40 \quad B=14 \quad J=41 & \left\{ \begin{aligned} L \cup J &= 80 - 16 \\ L \cup J &= 64 \\ L + J - L \cap J & \\ &= L \cap J \\ 40 + 41 - 64 &= 17 \end{aligned} \right. \\
 L \cap B = 9 \quad B \cap J = 7 & \\
 L \cap B \cap J = 4 & \\
 (L \cup B \cup J) = 14 &
 \end{aligned}$$

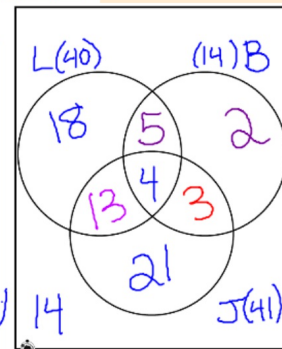
$$80 = L \cup J$$



6 Neville checked his letter box each day for 80 days. He received letters on 40 days, bills on 14 days, and junk mail on 41 days. He received letters *and* bills on 9 days, and bills *and* junk mail on 7 days. He received all three items on 4 days, and no items on 14 days.



- a Display this information on a Venn diagram.
- b Find the probability that, on a randomly chosen day, Neville received:
- i junk mail only
 - ii letters or junk mail, but not both
 - iii bills and letters, but not junk mail
 - iv bills, given that he did not receive junk mail
 - v junk mail or bills, given that he received letters.



$$\textcircled{i} P(L \cap B \cap J) = \frac{4}{80}$$

$$\textcircled{ii} P[(L \cup J) \cap (L \cap J)] = \frac{13}{80}$$

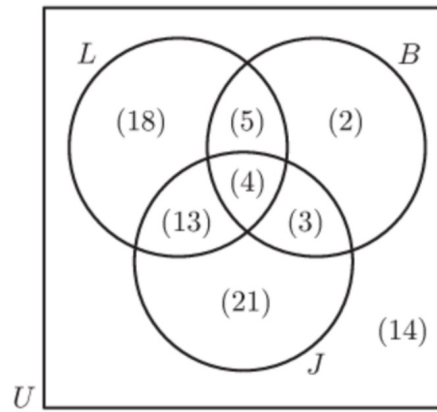
$$\textcircled{iii} P(B \cap L \cap J) = \frac{5}{80} = \frac{1}{16}$$

$$\textcircled{iv} P(B | J) = \frac{7}{41}$$

$$\textcircled{v} P((J \cup B) | L) = \frac{22}{40} = \frac{11}{20}$$

Mailbox

6 a

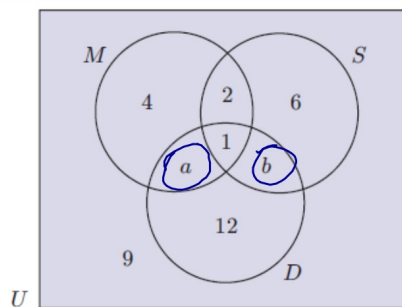


- b**
- i** $\frac{21}{80}$
 - ii** $\frac{47}{80}$
 - iii** $\frac{1}{16}$
 - iv** $\frac{7}{39}$
 - v** $\frac{11}{20}$

Exercises... 14| Venn Diagrams and Probability

The Venn diagram opposite indicates the types of program a group of 40 individuals watched on television last night.

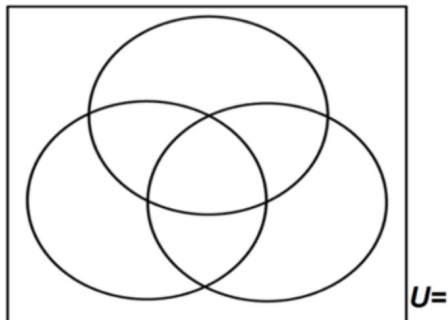
M represents movies, S represents sport, and D represents drama.



- a** Given that 10 people watched a movie last night, calculate a and b .
- b** Find the probability that one of these individuals, selected at random, watched:
- i** sport
 - ii** drama and sport
 - iii** a movie but not sport
 - iv** drama but not a movie
 - v** drama or a movie.

Exercises... 14| Venn Diagrams and Probability

2. There were 160 students that went to Costa Rica on a school trip. Pura Vida! On the trip, 95 students zip-lined through the jungle, 62 saw sloths, and 40 students visited a volcano. It is also known that 35 students zip-lined and saw sloths, 18 students zip-lined and visited a volcano, and 11 students saw sloths and visited a volcano. 34 students did exactly 2 of zip-lining, visiting a volcano, or seeing sloths.

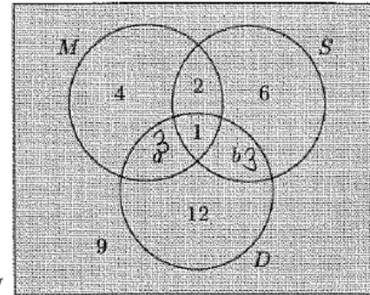


Exercise Solutions

1. Types of Movies

The Venn diagram opposite indicates the types of program a group of 40 individuals watched on television last night.

M represents movies, S represents sport, and D represents drama.



$$a = 10 - 7 = 3$$

$$40 - 37 = b$$

$$40 = U$$

a Given that 10 people watched a movie last night, calculate a and b .

b Find the probability that one of these individuals, selected at random, watched:

$P(S) = \frac{10}{40}$ i sport $\frac{3}{10}$

ii drama and sport $P(D \cap S) = \frac{4}{40}$

iii a movie but not sport

iv drama but not a movie

v drama or a movie.

$$= \frac{1}{10}$$

$$P(M \cap S') = \frac{7}{40}$$

$$P(D \cap M') = \frac{15}{40} = \frac{3}{8}$$

$$\textcircled{v} P(D \cup M) = \frac{25}{40} = \frac{5}{8}$$

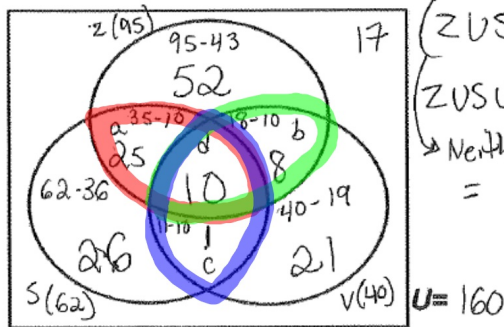
Exercise Solutions

2. There were 160 students that went to Costa Rica on a school trip. Pura Vida! On the trip, 95 students zip-lined through the jungle, 62 saw sloths, and 40 students visited a volcano. It is also known that 35 students zip-lined and saw sloths, 18 students zip-lined and visited a volcano, and 11 students saw sloths and visited a volcano. 34 students did exactly 2 of zip-lining, visiting a volcano, or seeing sloths.

$$\begin{aligned}
 Z &= 95 & 35 &= Z \cap S & \bullet \\
 S &= 62 & 18 &= Z \cap V & \bullet \\
 V &= 40 & 11 &= S \cap V & \bullet
 \end{aligned}$$



$$\begin{aligned}
 34 &= (Z \cap S \cap V)' \cup \\
 & \quad (Z \cap S' \cap V) \cup \\
 & \quad (Z' \cap S \cap V)
 \end{aligned}$$



$$\begin{aligned}
 (Z \cup S \cup V)' &= 160 - 143 \\
 Z \cup S \cup V &= 143 \\
 \rightarrow \text{Neither activity} &= 17 \\
 a + b + c &= 34 \\
 a + d &= 35 \quad a = 35 - d \\
 b + d &= 18 \quad b = 18 - d \\
 c + d &= 11 \quad c = 11 - d \\
 35 - d + 18 - d + 11 - d &= 34 \\
 64 - 3d &= 34 \\
 -3d &= -30 \\
 \boxed{d = 10}
 \end{aligned}$$