

PART II
Total Value: 50%

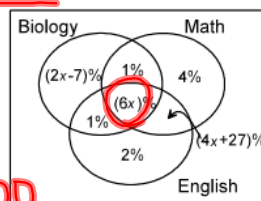
Answer **ALL** items in the space provided. Show **ALL** workings.

Value

3

51. 200 students wrote exams in Math, Biology and English. The Venn Diagram below represents the percentage of those who wrote the exams. Algebraically determine the percentage of students who wrote all three exams, and determine the number of students that this represents.

Solve for x



%
total
100%

$$2x - 7 + 8 + 6x + 4x + 27 = 100$$

$$12x = 100 - 27 - 8 + 7$$

$$12x = 72$$

$$x = 6$$

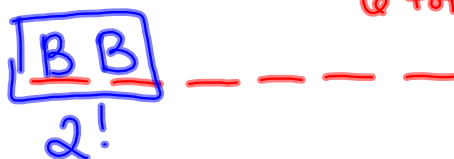
$$6x\% = 36\%$$

6(6) = 36%
wrote all 3

$$36\% \text{ of } 200 = 72 \text{ students}$$

- 2 52.(a) In how many ways can a teacher seat four girls and two boys in a row of six seats if the two boys must be seated next to each other?

6 total



$$5 \text{ objects} \rightarrow 5!$$

$$5! \cdot 2! = 240 \text{ ways}$$

Value

3 52.(b) Algebraically solve for n : ${}_nP_2 = 12$

formula
 ${}_nP_r = \frac{n!}{(n-r)!}$

$$\frac{n!}{(n-2)!} = 12$$

$$\frac{n \cdot (n-1) \cdot \cancel{(n-2)} \cdot \cancel{(n-3)} \cdot \cancel{(n-4)} \dots}{\cancel{(n-2)} \cdot \cancel{(n-3)} \cdot \cancel{(n-4)} \dots} = 12$$

$$n(n-1) = 12$$

$$n^2 - n - 12 = 0$$

add/mult

$$(x-4)(x+3) = 0$$

$x=4$ $x=-3$

add $\rightarrow -1$
 mult $\rightarrow -12$
 $-4 \quad +3$

2 52.(c) Four students are to be chosen from a group of 12 to fill the positions of president, vice-president, treasurer and secretary. In how many ways can this be accomplished?

order \rightarrow permutation

$${}_{12}P_4 = 11880$$

or

$$\frac{12}{\text{pres}} \cdot \frac{11}{\text{vice}} \cdot \frac{10}{\text{treas}} \cdot \frac{9}{\text{sec}} = 11880$$

3 53.(a) If a 5-digit number is generated at random from the digits 2, 3, 4, 5 and 8 (with no repetition), what is the probability that it will be an odd number?

chp 3
 $\frac{\text{fav}}{\text{total possible}}$

total possible 5 digit $\Rightarrow 5!$

fav \rightarrow odd # $\underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} \cdot \underline{2}$ \uparrow 3 or 5

$$\frac{48}{5!} = .4 \Rightarrow 40\%$$

Value
3

53.(b) A person will be randomly selected from a group to draw a marble from a bag. The odds of selecting a female from the group is 7:8 and the odds of drawing a red marble from the bag are 1:3. What is the probability of a non-red marble being drawn from the bag by a male from the group?

female
↓
7:8 $\Rightarrow \frac{7}{15}$

prob
male: $\frac{8}{15}$

red
↓
1:3 $\Rightarrow \frac{1}{4}$

prob
non-red: $\frac{3}{4}$

$$\frac{8}{15} \cdot \frac{3}{4} = \frac{24}{60} = 40\%$$

chp.4

4

54.(a) Simplify and state restrictions:

$$\frac{1-x^2}{8-8x} \div \frac{3x+3}{2(3x-1)}$$

$$\frac{1-x^2}{8-8x} \cdot \frac{2(3x-1)}{3x+3}$$

$$\frac{(1+x)(1-x)}{8(1-x)} \cdot \frac{2(3x-1)}{3(x+1)}$$

$$\begin{aligned} 3x-1 &\neq 0 \\ 3x &\neq 1 \\ x &\neq \frac{1}{3} \end{aligned}$$

restrictions: $x \neq 1, -1, \frac{1}{3}$

$$\frac{2(3x-1)}{24} = \frac{(3x-1)}{12}$$

Value

- 2 54.(b) Pat and Chris can paint the house in 5 hours if they work together. Pat is a professional painter and can paint twice as fast as Chris. How long would it take Pat to paint the house by himself?

	time	
Pat	x	$\frac{1}{x}$
Chris	$2x$	$\frac{1}{2x}$
Both	5	$\frac{1}{5}$

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{5}$$

$$\begin{aligned} 10 + 5 &= 2x \\ 15 &= 2x \\ 7.5 &= x \end{aligned}$$

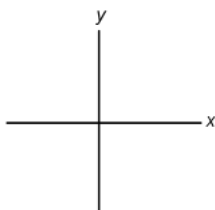
$$CD = 10x$$

$$\frac{10}{10x} + \frac{5}{10x} = \frac{2x}{10x}$$

$$\begin{aligned} \text{Pat} &\Rightarrow 7.5 \text{ hrs} \\ \text{Chris} &\Rightarrow 15 \text{ hrs} \end{aligned}$$

- 2 55.(a) Sketch two possible graphs that are different, yet are both cubic functions with negative leading coefficients and negative y-intercepts. Explain why the graphs you have sketched are different.

Graph 1:



Graph 2:

