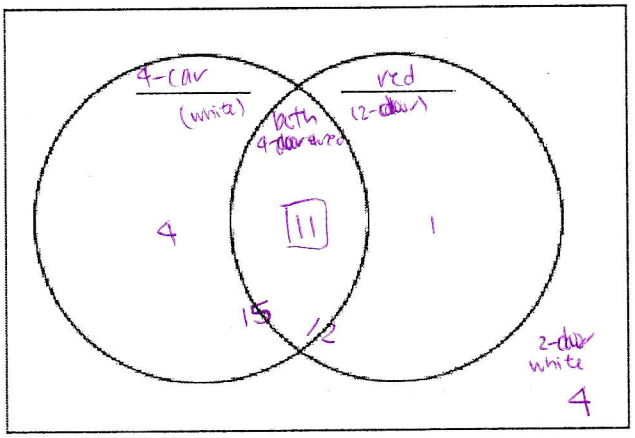
SOLUTIONS

Venn Diagram Challenge Problems (Math Circle November 2019)

1) There are 20 cars in front of UCLA's Math-Sciences building. All of the cars are red or white. 12 of them are red, 15 of them are 4-door, and 4 of them are 2-door and white. How many of the cars are 4-door and red?

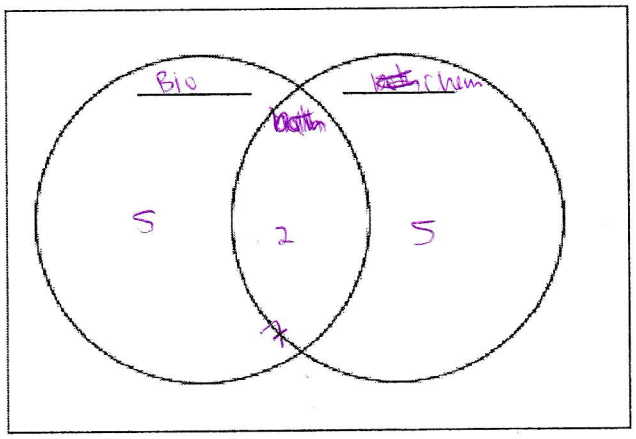


total = 20 = 15 + 12 + 4 − both
20 = −both + 31
both = 11

red cars : 12
4-door : 15
white : 8
2-door : 5

	red	white	
4-Door	11	4	= 15
2-Door	1	4	= 5
	12	8	

2) All 12 players of a V's basketball team are taking at least a biology or chemistry class. If 7 players are taking biology and 2 players are taking both sciences, how many players are taking chemistry?



total chem = 5 + 2 = 7

7 = only bio + both

both = 2

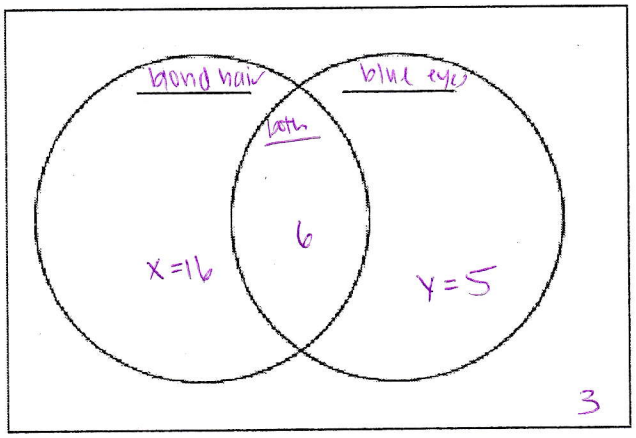
7 = only bio + 2

only bio = 5

total = 12, total = only bio + both + only chem

only chem = 12 − 5 − 2 = 5

3) There are 30 students in Ashin's kindergarten class. If there are twice as many students with blond hair as with blue eyes, 6 students with blond hair and blue eyes, and 3 students with neither blond hair nor blue eyes, how many students have blue eyes?



① x + 6 + y + 3 = total = 30

② total blond = 2(total blue)

x + 6 = 2(y + 6)

→ solve for x & y!

① x + y + 9 = 30

x + y = 21

(2y + 6) + y = 21

3y + 6 = 21

3y = 15

y = 5

② x + 6 = 2y + 12

x = 2y + 6

x = 2(5) + 6

x = 10 + 6

x = 16

blue eyes: 5 + 6 = 11

4) At the Gooddog Obedience School, dogs can learn to do three tricks: sit, stay, and roll over. Of the dogs at the school:

a) 50 dogs can sit

b) 17 dogs can sit and stay

c) 29 dogs can stay

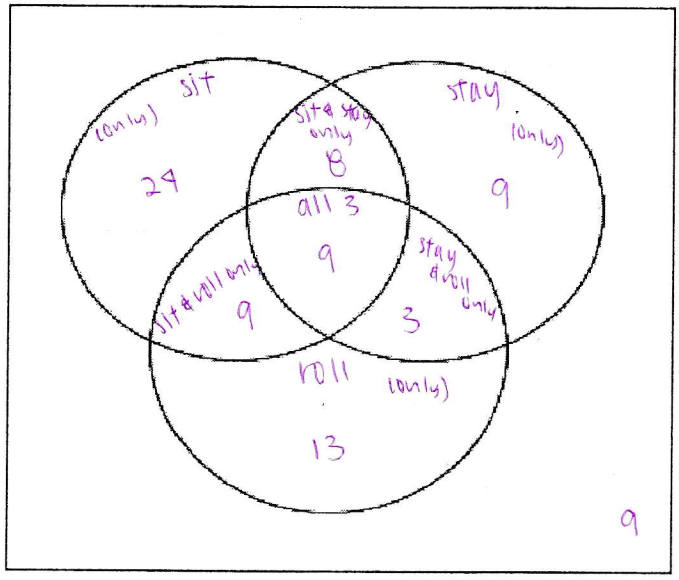
d) 12 dogs can stay and roll over

e) 34 dogs can roll over

f) 18 dogs can sit and roll over

g) 9 dogs can do all three

h) 9 dogs can do none



sit & stay only: $17 - 9 = 8$

stay & roll only: $12 - 9 = 3$

sit & roll only: $18 - 9 = 9$

i) How many dogs are in the school?

$9 + 29 + 8 + 9 + 9 + 3 + 9 + 13 = 84$ dogs

$50 + 29 + 34 - 17 - 12 - 18 + 9 + 9 = 84$ ✓

(at least 1; at least two; all 3; none)

ii) How many dogs can do exactly 2 tricks?

$9 + 8 + 3 = 20$ dogs