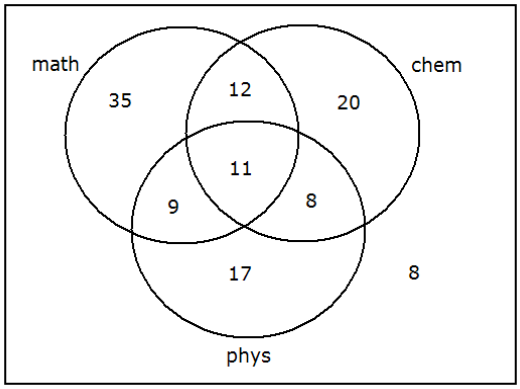
Math 118 **Sample Quiz 10** Answers

1. Find the volume of a cone with a height of 5 in and with a circular base with a radius of 4 in.
   $\frac{80}{3}\pi$ in$^3$ $\cong 83.776$ in$^3$
2. The supplement of an angle is $8°$ less than three times the angle. Find the angle. $47°$
3. Find the measure of an inner angle in a regular polygon of 18 sides. $160°$
4. Let $U = \{1,2,3,4,5,6,7,8,9,10\}$, $A = \{1,2,4,7,8\}$, $B = \{2,4,6,8,9\}$, and $C = \{2,3,7,9,10\}$.
   (a) Find $A \cap (B \setminus C')'$. $\{1,4,7,8\}$
   (b) How many four-element subsets does $U$ have? $\binom{10}{4} = 210$
   (c) We randomly pick an element of $A \cup B$. What is the probability that we pick a number that is also an element of $C$? $\frac{3}{7}$
   (d) We randomly pick an element of $A \cup B$. What is the probability that we pick a number that is also an element of $A \cap B$? $\frac{3}{7}$
5. We asked 120 students about their courses. 67 take math, 51 take chemistry, and 45 take physics. 23 take math and chemistry, 20 take math and physics, and 19 take chemistry and physics. 11 take all three.
   (a) Draw a Venn diagram depicting these sets.




   (b) How many people study math and chemistry, but not physics? 12
   (c) How many people study math or chemistry, but not physics? $35 + 12 + 20 = 67$
   (d) We randomly pick a student. What is the probability that he studies math? $\frac{67}{120}$
   (e) We randomly pick a student. Turns out, we picked someone who studies physics. What is the probability that she also studies math? $\frac{20}{45} = \frac{4}{9}$
   (f) We randomly pick a student. Turns out, we picked someone who studies math. What is the probability that she also studies physics? $\frac{20}{67}$

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6. We have borrowed \$2000 for two years, with a simple annual interest rate of 5%. After a year, we make a partial payment of \$800. After 7 additional months, we make another partial payment of \$800. How much do we have to pay at the end of the two years? \$ 549.12

7. We wish to buy a used car for \$ 8000. The dealership has a finance plan of \$ 1000 down payment and 7% APR for 36 months. Find the monthly payment under this plan. \$216. 144

8. We wish to buy a used car for \$ 5000. Tha dealership has a finance plan that includes a down payment of \$ 1000, and then 30 payments of \$ 143.01. Find the APR that the bank charges. 5.5%

9. We have 15 marbles in a bag: 10 blue, 4 red, and 1 green. We randomly pull two marbles, with replacement. Find the probability of each of the following events.

   (a) We pull two marbles of different colors. $\frac{12}{25}$

   (b) We pull at least one blue marble. $\frac{8}{9}$

   (c) If we pull two marbles of the same color, we receive \$ 5\$. If we pull two marbles of different colors, we pay \$ 2. Find the expected value of this game. $E = \$\ \frac{41}{25} = \$\ 1.64$

   $$P(\text{same color}) = \left(\frac{10}{15}\right)^2 + \left(\frac{4}{15}\right)^2 + \left(\frac{1}{15}\right)^2 = \frac{13}{25}$$

   $$P(\text{different colors}) = 1 - \frac{13}{25} = \frac{12}{25}$$

   $$E = (5)\frac{13}{25} + (-2)\frac{12}{25} = \frac{41}{25} = 1.64$$

10. We have 15 marbles in a bag: 10 blue, 4 red, and 1 green. We randomly pull two marbles, without replacement. Find the probability of each of the following events.

    (a) We pull two marbles of different colors. $\frac{18}{35}$

    (b) We pull at least one blue marble. $\frac{19}{21}$

    (c) If we pull two marbles of the same color, we receive \$ 5. If we pull two marbles of different colors, we pay \$ 2. Find the expected value of this game. $E = \$\ \frac{7}{5} = \$\ 1.4$

    $$P(\text{same color}) = \frac{10}{15}\left(\frac{9}{14}\right) + \frac{4}{15}\left(\frac{3}{14}\right) = \frac{17}{35}$$

    $$P(\text{different colors}) = 1 - \frac{17}{35} = \frac{18}{35}$$

    $$E = (5)\frac{17}{35} + (-2)\frac{18}{35} = \frac{7}{5} = 1.4$$

11. We throw a coin seven times. What is the probability that the outcome is

    (a) exactly 5 heads $\frac{21}{128}$

    (b) at least 5 heads $\frac{29}{128}$

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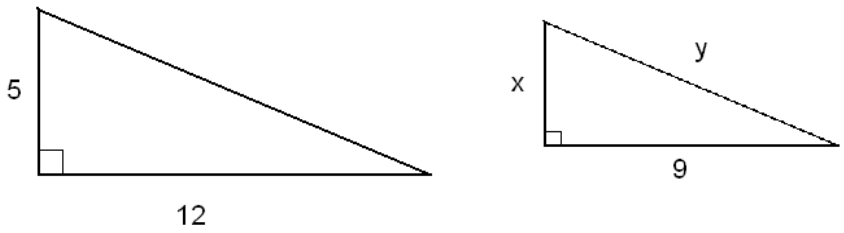
(c) Provided that we know that there were less than three heads, what is the probability that the number of heads was two? $\dfrac{\binom{7}{2}}{\binom{7}{2}+\binom{7}{1}+\binom{7}{0}} = \dfrac{21}{29}$

12. The triangles shown on the picture below are similar. Find the value of $x$ and $y$. $x = \dfrac{15}{4}, \quad y = \dfrac{39}{4}$




13. The picture below shows a right triangle. Find the exact values of $x$, $y$, and $z$. $x = 255$, $y = 136$, $z = 120$