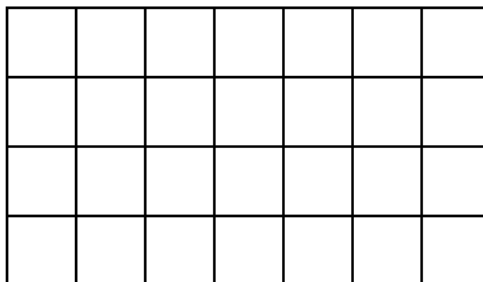


## Review Problems

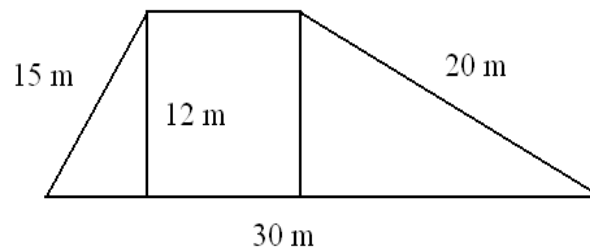
1. Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{2, 3, 4, 5, 8\}$ ,  $B = \{1, 3, 4, 6\}$ , and  $C = \{1, 3, 5, 7, 10\}$ .
  - a) Draw a Venn diagram depicting these sets.
  - b) Find  $(B \cup C) \cap A$
  - c) Find  $B \cup (C \cap A)$
  - d) Find  $(A \cap \overline{B}) \cup (B \cap \overline{A})$
  - e) Find  $(A \cup \overline{B}) \cap C$
  - f) Find  $\overline{A \cup \overline{B}} \cap \overline{C}$
  - g) List all subsets of  $C$ .
  - h) How many 5-element subsets does  $U$  have? (You don't have to list these sets.)
  - i) We randomly select an element of  $A$ . What is the probability that the number selected is also an element of  $B$ ?
  - j) We randomly select an element of  $B$ . What is the probability that the number selected is also an element of  $A$ ?
  - k) We randomly select an element of  $A$ . What is the probability that the number selected is not an element of  $B$ ?
  - l) We randomly select an element of  $A$ . What is the probability that the number selected is not an element of  $B$  and  $C$ ?
  - m) We randomly select an element of  $A$ . What is the probability that the number selected is not an element of  $B$  or  $C$ ?
  - n) We randomly select an element of  $A \cup B$ . What is the probability that the number selected is also an element of  $A \cap B$ ?
  - o) We randomly select an element of  $A \cap B$ . What is the probability that the number selected is also an element of  $A \cup B$ ?
  - p) We randomly select an element of  $A$ . What is the probability that the number selected is also an element of  $\overline{A}$ ?
2. Find  $|X \cap Y|$  if we know that  $|X| = 29$ ,  $|Y| = 35$ , and  $|X \cup Y| = 52$ .
3. A company placed some money into a bank account with a simple annual interest rate of 8%. A year later they had \$155 520 in the account. How much money did the company deposit a year ago?
4. The population of a town has increased by 120%. Now there are 264 000 residents in the town. How many were there before?
5. We borrowed \$4000 for three years, with a simple annual interest rate of 9%. After 11 months, we make a partial payment of \$1500. After an additional 7 months, we make another partial payment of \$2000. How much do we owe at the end of the three years?
6.
  - a) We want to buy a car for \$5000. The dealership has a finance plan with a down payment of \$1500 and 36 monthly payments with an APR of 8.5%. Compute the monthly payment under this plan.
  - b) We want to buy a car for \$8000. The dealership has a finance plan with a down payment of \$2000 and 24 monthly payments of \$268.63. What is the APR of this plan?
7. We placed \$2000 into a bank account with an annual compound interest rate of 8%. How much money do we have after 15 years if the bank compounds
  - a) annually
  - b) semi-annually
  - c) monthly
  - d) daily
  - e) continuously

8. Find the sum  $\binom{6}{0} + \binom{6}{2} + \binom{6}{4} + \binom{6}{6}$
9. We asked 200 people if they listen to radio, watch TV or read books. 127 watch TV, 90 listen to radio, and 80 read books. 52 watch TV and listen to radio, 57 watch TV and read books, and 48 listen to radio and read books. 35 do all three.
- Draw a Venn diagram depicting the information given.
  - How many people only read books?
  - How many people read books or watch TV?
  - How many people do neither of these?
  - We randomly pick a person among the people listening to radio. What is the probability that he or she also reads books?
  - We randomly pick a person among the people reading books. What is the probability that he or she also listens to radio?
  - We randomly pick a person among the people watching TV. What is the probability that he or she does not listen to radio?
10. A club has 20 members.
- In their annual election, they elect their president, vice president, and secretary. How many different outcome is possible?
  - If everyone shakes hands with everyone in the room, how many handshakes took place?
11. Suppose that  $X$  is a set with  $|X| = 12$ .
- How many 6–element subsets does  $X$  have?
  - We randomly pick a subset  $A$  of  $X$ . What is the probability that  $|A| = 4$ ?
12. We randomly pick a four-digit number. What is the probability that
- none of its digits is 0.
  - none of its digits is 9
13. Consider the picture shown below.

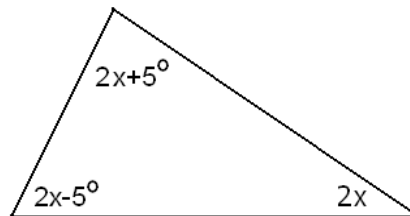


- How many rectangles are there on the picture?
  - How many squares are there on the picture?
  - We randomly select a rectangle. What is the probability that the selected rectangle is a square?
14. The shorter sides of a right triangle are 120 ft and 350 ft long.
- Find the perimeter of the triangle. Include units in your computation and answer.
  - Find the area of the triangle. Include units in your computation and answer.
15. Find the distance between the points  $(2, -6)$  and  $(-6, 9)$ .
16. The supplement of an angle is  $24^\circ$  less than twice the angle. Find this angle.

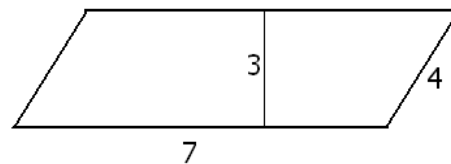
17. Find the area and perimeter of the trapezoid shown on the picture below. Include units in your computation and answer.



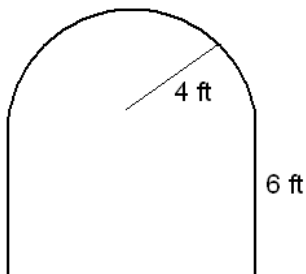
18. Find the measure of an inner angle in a regular polygon of 16 sides.  
 19. Find  $x$  based on the picture below.



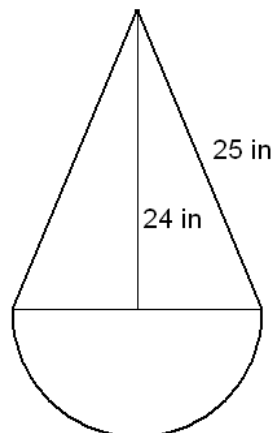
20. Find the perimeter and area of the parallelogram shown below. Dimensions are in meters.



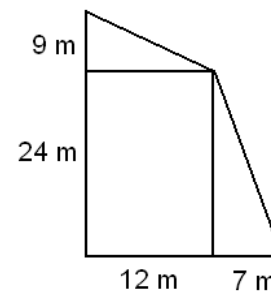
21. Find the perimeter and area of each of the figures shown below. Angles that look like right angles are right angles. The arcs are semicircles.



a)

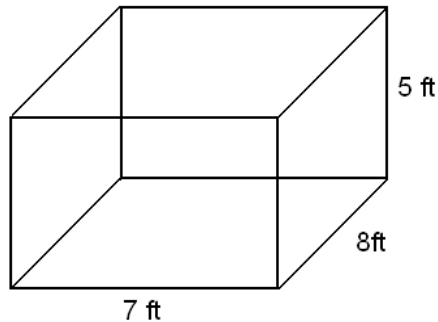


b)

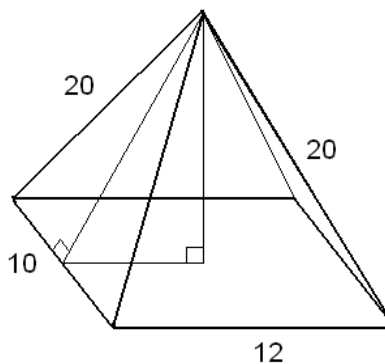


c)

22. Consider the rectangular prism shown on the picture below. Find the exact value of the length of the main diagonal.



23. Find the area of the triangle with sides 16 cm, 9 cm, and 9 cm long.
24. Consider the pyramid shown on the picture below. Compute the height of the pyramid. Dimensions are in meters.

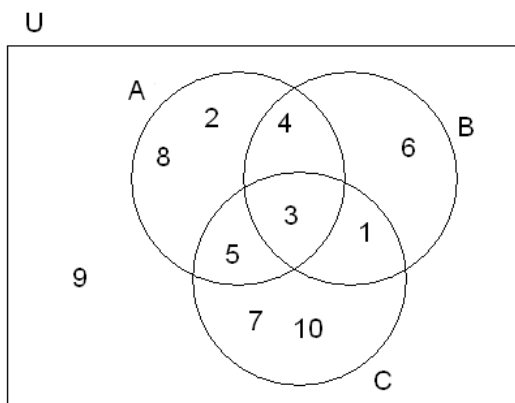


25. We roll a die. What is the probability that we roll a number
- a) greater than 4?                      b) not 4?
26. We throw a die twice in a row. Find each of the following probabilities.
- a) The second number rolled is larger than the first number rolled.
- b) The sum of the two numbers rolled is 6.
- c) The product of the two numbers rolled is 6.
27. We toss a coin 10 times in a row.
- a) What is the total number of outcomes?
- b) Find the probability of 3 heads and 7 tails.
- c) Find the probability of 5 heads and 5 tails.
- d) Find the probability of the number of tails being 3 or more.
28. Susan is a member of a 16-member club. The club is to elect a four-person committee. What is the probability that Susan will be selected to be on the committee?

29. We have a bag with 10 marbles, 6 red, 3 blue, and 1 yellow. We randomly pull a marble. Find each of the following probabilities.
- We pull a red marble.
  - We pull a marble that is red or blue.
  - We pull a marble that is not blue.
30. Re-write each of the following numbers as a fraction of integers. You do not have to reduce the fractions.
- $0.\overline{138}$
  - $0.20\overline{4}$
  - $0.2\overline{493}$

### Answers

- 1.) a) see below b)  $\{3, 4, 5\}$  c)  $\{1, 3, 4, 5, 6\}$  d)  $\{1, 2, 5, 6, 8\}$  e)  $\{3, 5, 7, 10\}$  f)  $\{6\}$



- g) all subsets of  $C$ :

$$\emptyset, \{1\}, \{3\}, \{5\}, \{7\}, \{10\}$$

$$\{1, 3\}, \{1, 5\}, \{1, 7\}, \{1, 10\}, \{3, 5\}, \{3, 7\}, \{3, 10\}, \{5, 7\}, \{5, 10\}, \{7, 10\}$$

$$\{1, 3, 5\}, \{1, 3, 7\}, \{1, 3, 10\}, \{1, 5, 7\}, \{1, 5, 10\}, \{1, 7, 10\}, \{3, 5, 7\}, \{3, 5, 10\}, \{3, 7, 10\}, \{5, 7, 10\}$$

$$\{1, 3, 5, 7\}, \{1, 3, 5, 10\}, \{1, 3, 7, 10\}, \{1, 5, 7, 10\}, \{3, 5, 7, 10\}$$

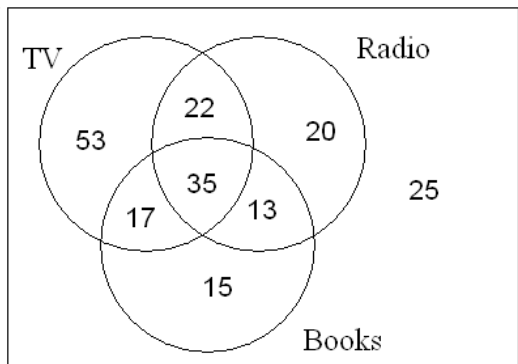
$$\{1, 3, 5, 7, 10\}$$

h) 252    i)  $\frac{2}{5}$     j)  $\frac{1}{2}$     k)  $\frac{3}{5}$     l)  $\frac{4}{5}$     m)  $\frac{2}{5}$     n)  $\frac{2}{7}$     o) 1    p) 0

2.) 12    3.) \$144 000    4.) 120 000    5.) \$1110.68    6.) a) \$110.48    b) 7%

7.) a) \$6344.34    b) \$6486.80    c) \$6613.84    d) \$6639.35    e) \$6640.23    8.) 32

9.) a) see below    b) 15    c) 155    d) 25    e)  $\frac{48}{90} = \frac{8}{15}$     f)  $\frac{48}{80} = \frac{3}{5}$     g)  $\frac{70}{127}$



10.) a) 6840    b) 190    11.) a) 924    b)  $\frac{\binom{12}{4}}{2^{12}} = \frac{495}{4096}$

12.) a)  $\frac{9^4}{9 \cdot 10^3} = \frac{729}{1000}$     b)  $\frac{8 \cdot 9^3}{9 \cdot 10^3} = \frac{5832}{9000} = \frac{81}{125}$     13.) a) 280    b) 60    c)  $\frac{3}{14}$

14.) a)  $P = 840$  ft    b)  $A = 2100$  ft<sup>2</sup>    15.) 17 units    16.) 68°    17.)  $P = 70$  m,  $A = 210$  m<sup>2</sup>

18.) 157.5°    19.) 30    20.)  $P = 22$  m,  $A = 21$  m<sup>2</sup>

21.) a)  $P = (4\pi + 20)$  ft  $\approx 32.566371$  ft     $A = (8\pi + 48)$  ft<sup>2</sup>  $\approx 73.13274123$  ft<sup>2</sup>

b)  $P = (50 + 7\pi)$  in = 71.991149 in     $A = \left(\frac{49}{2}\pi + 168\right) \approx 244.96902$  in<sup>2</sup>

c)  $P = 92$  m     $A = 426$  m<sup>2</sup>    22.)  $\sqrt{138}$  ft    23.)  $A = 8\sqrt{17}$  cm<sup>2</sup>  $\approx 32.9848$  cm<sup>2</sup>

24.)  $\sqrt{339}$  m    25.) a)  $\frac{2}{6} = \frac{1}{3}$     b)  $\frac{5}{6}$     26.) a)  $\frac{15}{36} = \frac{5}{12}$     b)  $\frac{5}{36}$     c)  $\frac{4}{36} = \frac{1}{9}$

27.) a) 1024    b)  $\frac{\binom{10}{3}}{2^{10}} = \frac{120}{1024} = \frac{15}{128}$     c)  $\frac{\binom{10}{5}}{2^{10}} = \frac{252}{1024} = \frac{63}{256}$

d)  $\frac{2^{10} - \left(\binom{10}{0} + \binom{10}{1} + \binom{10}{2}\right)}{2^{10}} = \frac{968}{1024} = \frac{121}{128}$     28.)  $\frac{\binom{15}{3}}{\binom{16}{4}} = \frac{1}{4}$

29.) a)  $\frac{6}{10} = \frac{3}{5}$     b)  $\frac{9}{10}$     c)  $\frac{7}{10}$     30.) a)  $\frac{137}{990}$     b)  $\frac{184}{900}$     c)  $\frac{2491}{9990}$