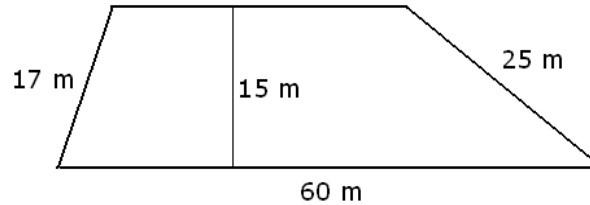
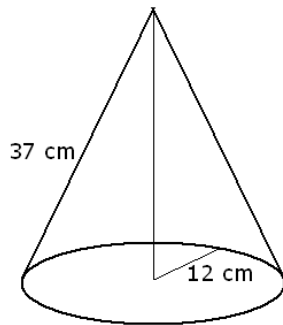


Review Problems

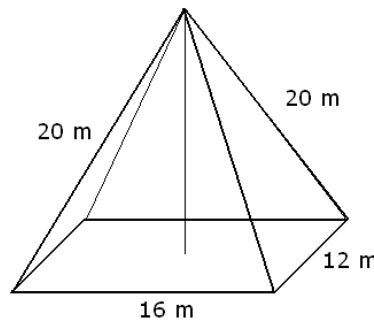
1. Consider the trapezoid shown on the picture below.



- Compute the perimeter of the trapezoid. Include units in your computation and answer.
 - Compute the area of the trapezoid. Include units in your computation and answer.
 - The base of a solid is this trapezoid. Compute its volume if its height 10 m. Include units in your computation and answer.
 - The base of a pyramid is this trapezoid. Compute its volume if its height 10 m. Include units in your computation and answer.
2. a) Find the volume of a cylinder with a height of 5 in and with a circular base with a radius of 4 in.
 b) Find the volume of a cone with a height of 5 in and with a circular base with a radius of 4 in.
3. Find the volume for each of the following objects shown on the figure below. Include units in your computation and answer.



a)

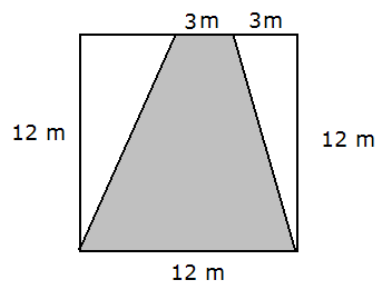


b)

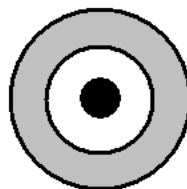
4. The supplement of an angle is 8° less than three times the angle. Find the angle.
5. Find the measure of an inner angle in a regular polygon of 18 sides.
6. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 2, 4, 7, 8\}$, $B = \{2, 4, 6, 8, 9\}$, and $C = \{2, 3, 7, 9, 10\}$.
- Find $A \cap \overline{B \cap C}$
 - How many four-element subsets does U have?
 - 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 ?
 - We randomly pick an element of A . What is the probability that we pick a number that is also an element of $A \cap B$?

7. 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?
 - c) How many people study math or chemistry, but not physics?
 - d) We randomly pick a student. What is the probability that he studies math?
 - e) We randomly pick a student. Turns out, we picked someone who studies physics. What is the probability that she also studies math?
 - f) We randomly pick a student. Turns out, we picked someone who studies math. What is the probability that she also studies physics?
8. 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?
9. Find the present value of \$10 000, paid exactly twenty years from today. Assume an annual 4% compound interest rate, compounded continuously.
10. What is a better deal, to receive \$2500 now or \$3000 five years from now?
 - a) Assume an annual compound interest rate of 3%, compounded continuously.
 - b) Assume an annual compound interest rate of 4%, compounded continuously.
11. Find the present value of three annual payments of \$2000, starting with the first payment now. Assume a compound annual interest rate of 7%, compounded
 - a) annually
 - b) semi-annually
 - c) quarterly
 - d) monthly
 - e) daily
 - f) continuously
12. Find the present value of three annual payments of \$2000, starting with the first payment a year from today. Assume a compound annual interest rate of 7%, compounded
 - a) annually
 - b) semi-annually
 - c) quarterly
 - d) monthly
 - e) daily
 - f) continuously
13. 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.
14. We wish to buy a used car for \$5000. The dealership has a finance plan that includes a down payment of \$1000, and then 30 payments of \$143.01. Find the APR that the dealership charges.
15. 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.
 - b) We pull at least one blue marble.
 - c) We play the following game. If we pull two 2 blue marbles, we pay \$5. If we pull one blue marble, we pay \$1. If we pull no blue marbles, we receive \$20. Find the expected value for this game.
16. 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.
 - b) We pull at least one blue marble.
 - c) We play the following game. If we pull two 2 blue marbles, we pay \$5. If we pull one blue marble, we pay \$1. If we pull no blue marbles, we receive \$20. Find the expected value for this game.
17. We pull two cards from $\{1, 2, \dots, 10\}$, without replacement.
 - a) If the product of the two number pulled is even, we pay \$3. If it is odd, we receive \$10. Find the expected value of this game.

- b) If the sum of the two number pulled is even, we pay \$3. If it is odd, we receive \$10. Find the expected value of this game.
18. We throw a coin seven times. What is the probability that the outcome is
- exactly 5 heads
 - at least 5 heads
 - If we get heads all seven times, we receive \$100. In all other cases, we pay \$1. Find the expected value for this game.
19. A healthy 40 year old male wishes to buy a health insurance policy for a year. The insurance would pay \$100 000 in case of death. The insurance company charges \$1000 for this policy. Statistical data tells us that a healthy 40 year old male has a 0.3 percent chance to die this year. Find the expected value of this policy
- for the customer
 - for the insurance company.
20. Three cards are drawn from a deck of 52 cards, with replacement.
- What is the probability that we draw three hearts?
 - What is the probability that we draw three hearts, given that no clubs was drawn?
 - We play the following game. If all three cards are hearts, we get \$50. Otherwise, we pay \$1. Find the expected value for this game.
21. Three cards are drawn from a deck of 52 cards, without replacement.
- What is the probability that we draw three hearts?
 - What is the probability that we draw three hearts, given that no clubs was drawn?
 - We play the following game. If all three cards are hearts, we get \$50. Otherwise, we pay \$1. Find the expected value for this game.
22. Find the distance between the points $(13, -1)$ and $(1, -6)$.
23. The figure below shows a trapezoid drawn into a square. We randomly throw a small object on the square. Find the probability of the object landing on the shaded region.

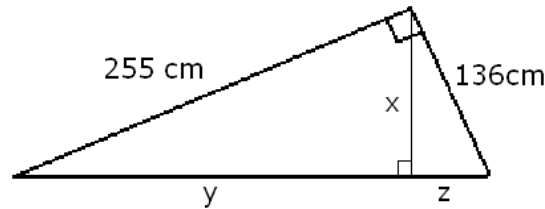


24. The three circles have radii 1 ft, 2 ft, and 3 ft long. Suppose we randomly drop a small object on the figure.

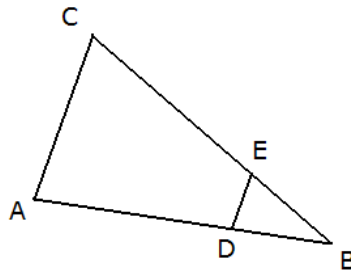


- What is the probability that it lands on the black region?
- What is the probability that it lands on the black region?

- c) What is the probability that it lands on the grey region?
 d) We play the following game. If the object lands on the black region, we get \$20. If it land on the white area, we pay \$1. If it lands on the grey area, we pay \$3. Find the expected value of this game.
25. We have 25 marbles in a container, all blue and red. We play the following game. We randomly pull a marble. If it is blue, we receive \$5. If it is red, we pay \$2. How many blue marbles are in the bag if the expected value of this game is 24 cents?
26. Find the exact value of x , y , and z based on the picture below.



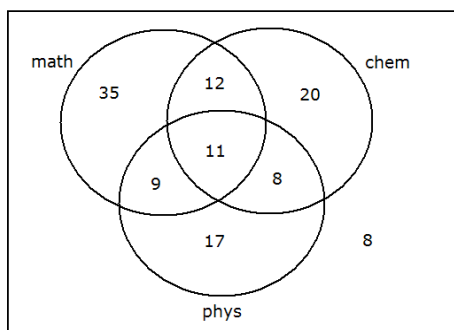
27. A 6 feet tall person is standing 15 feet away from a street light that is 30 feet tall. How long is his shadow?
28. a) Compute the area of a triangle with sides 10 cm, 10 cm, and 16 cm.
 b) Compute the area of a triangle that is similar to the triangle in part a), but its sides are twice as long.
29. Consider the picture shown below. Line segments AC and DE are parallel. How long is AD if the following is given: $AC = 10$, $DE = 2$, and $DB = 3$



30. Expand $(a + b)^7$
31. Compute the coefficient of x^5y^{15} in the expansion of $(x + y)^{20}$.
32. A student is completing an exam that consists of multiple choice questions. Each question comes with five answers: four wrong and one correct. The test consists of four questions and the student selects the answers randomly. Compute each of the following probabilities.
- a) she will get all four questions right
 b) she will get three questions right
 c) she will get two questions right
 d) she will get only one question right
 e) she will get none of the questions right

Answers

- 1.) a) $P = 134 \text{ m}$ b) $A = 690 \text{ m}^2$ c) $V = 6900 \text{ m}^3$ d) $V = 2300 \text{ m}^3$
 2.) a) $V = 80\pi \text{ in}^3 \approx 251.3274123 \text{ in}^3$ b) $V = \frac{80}{3}\pi \text{ in}^3 \approx 83.7758041 \text{ in}^3$
 3.) a) $V = 1680\pi \text{ cm}^3 \approx 5277.875658 \text{ cm}^3$ b) $V = 64\sqrt{300} \text{ m}^3 \approx 1108.512517 \text{ m}^3$
 4.) 47° 5.) 160° 6.) a) $\{1, 4, 7, 8\}$ b) 210 c) $\frac{3}{7}$ d) $\frac{3}{5}$
 7.) a) see below b) 12 c) 67 d) $\frac{67}{120}$ e) $\frac{4}{9}$ f) $\frac{20}{67}$



- 8.) \$549.12 9.) \$4493.29 10.) a) \$3000 in five years is a better deal b) \$2500 now is a better deal
 11.) a) \$5616.04 b) \$5609.91 c) \$5606.74 d) \$5604.59 e) \$5603.54 f) \$5603.50
 12.) a) \$5248.63 b) \$5236.91 c) \$5230.86 d) \$5226.75 e) \$5224.74 f) \$5224.67
 13.) \$216.144 14.) 5.5% 15.) a) $\frac{12}{25}$ b) $\frac{8}{9}$ c) $-\frac{4}{9} = -\$0.\bar{4}$
 16.) a) $\frac{18}{35}$ b) $\frac{19}{21}$ c) $-\$ \frac{5}{7} = -\0.7142857 17.) a) $-\frac{1}{9} = -0.\bar{1} \approx -\0.11 b) $\frac{38}{9} = 4.\bar{2} \approx 4.22$
 18.) a) $\frac{21}{128}$ b) $\frac{29}{128}$ c) $-\frac{27}{128} = -0.2109375$ 19.) a) $-\$700$ b) $\$700$
 20.) a) $\frac{1}{64}$ b) $\frac{22}{703}$ c) $-\$ \frac{13}{64} = -\$0.203125 \approx -\$0.20$
 21.) a) $\frac{11}{850}$ b) $\frac{1}{27}$ c) $-\$ \frac{17}{50} = -\0.34 22.) 13 23.) $\frac{5}{8}$
 24.) a) $\frac{1}{9}$ b) $\frac{1}{3}$ c) $\frac{5}{9}$ d) $\$ \frac{2}{9} = \$0.\bar{2}$ 25.) 8
 26.) $x = 120 \text{ cm}$ $y = 225 \text{ cm}$ and $z = 64 \text{ cm}$ 27.) $3.75 \text{ feet} = \frac{15}{4} \text{ feet}$ 28.) a) 48 cm^2 b) 192 cm^2
 29.) 12 30.) $a^7 + 7a^6b + 21a^5b^2 + 35a^4b^3 + 35a^3b^4 + 21a^2b^5 + 7ab^6 + b^7$ 31.) $\binom{20}{5} = 15504$
 32.) a) $0.2^4 = 0.0016$ b) $\binom{4}{1}0.2^3 \cdot 0.8 = 0.0256$ c) $\binom{4}{2}0.2^2 \cdot 0.8^2 = 0.1536$
 d) $\binom{4}{3}0.2 \cdot 0.8^3 = 0.4096$ e) $(0.8^4) = 0.4096$