

Answers to Selected Problems

1.

Answers to Selected Problems

Exercises 1.1

1. (Compute the following sums by making use of the properties of number.)

(a) $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$

(c) $1 + 3 + 5 + 7 + 9 + 9 + 7 + 5 + 3 + 1 = 50$

(e) $(4 + 5 + 6) + (5 + 6 + 7) + (6 + 7 + 8) + (8 + 9 + 10) = 81$

(g) $10 + 2 + 20 + 30 - 2 + 40 - 3 + 50 + 3 + 60 - 5 = 205$

(i) $35 + 36 + 37 + 38 + 39 + 40 + 41 + 42 + 43 + 44 + 45 = 440$

2. (Find the following sums:)

(a) $10 + 11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 = 145$

(c) $50 + 51 + 52 + 53 + 54 + 55 + 56 + 57 + 58 + 59 + 60 + 61 + 62$
 $+ 63 + 64 + 65 + 66 + 67 + 68 + 69 = 1190$

(e) $98 + 87 + 76 + 65 + 54 + 43 + 32 + 21 + 19 = 495$

(g) $11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 91 + 81 + 71 + 61$
 $+ 51 + 41 + 31 + 21 + 11 = 594$

5. The sum of all the odd numbers from 11 to 59 is 875.

8. (Find the following sum:)

Exercises 1.2

2. **Answers to Selected Problems**

1. (Compute the following products by making use of the properties of numbers.)

(a) $2(7)(5)(9) = 630$

(c) $3(4)(25)27 = 8100$

(e) $4(4)(4)(25)(25)(25)(25) = 25,000,000$

(g) $4(7)(5)(5)(5) = 3500$

(i) $75(4)(6) = 1800$

(k) $0.25(144) = 36$

(m) $2.5(36) = 90$

(o) $75(84) = 6300$

3. (Compute the following:)

Exercises 1.3

1. (In each case, obtain an estimate of the product, and then compute the exact value using the distributive property.)

(a) estimate: $25(\mathbf{40}) = 1000$ exact value: $25(39) = 975$

(c) estimate: $25(\mathbf{50}) = 1250$ exact value: $25(49) = 1225$

(e) estimate: $\mathbf{75}(36) = 2700$ exact value: $74(36) = 2664$

2. (Compute the following:)

(a) $4.95(16) = 79.2$

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(c) $4.75(12) = 57$

(e) $0.15(68) = 10.2$

3. (a) The price of 7 pounds of Aku is \$41.65.

(c) The distance is 125 miles.

(e) The price of a 25-pound turkey is \$14.75.

Exercises 1.4

(Simplify the following expressions:)

1.

Exercises 2.1

1. (a)
(c)
(e)
(g)
(i)
(k)
(m)
(o)
(q)

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3. (a) The amount under Plan 1 =

$$= 1378 \text{ dollars}$$

The amount under Plan 2 =
= 4095 dollars

So, Plan 2 is by far advantageous to you.

(b) and (c): We do not want to spoil the fun of solving these problems.

Exercises 2.2

1. (b) The full-tank contains 12 gallons of gas and the price of 1 gallon of gas is \$1.75. So, the price of the full-tank of gas is $12(1.75)$ or 21 dollars.
- (c) If we drive 200 miles per week, then in 52 weeks we drive $52(200)$ or 10,400 miles. The gas mileage of our car is 28 miles per gallon. The question becomes how many 28 are in 10,400? Dividing 10,400 by 28, we see that there are about 371 of 28's. So, it requires about 371 gallons of gas to drive the distance of 10,400 miles. Since one gallon of gas costs \$1.75, 371 gallons of gas costs $371(1.75)$ or 649.25 dollars. So, we spend about \$650 on gas in one year.
- (d) First we compute the number of gallons of gas we can buy with \$80. It is $\frac{80}{1.75}$. So, we can buy about 46 gallons of gas. Since with each gallon of gas we can go 28 miles, we can go about $46(28)$ or 1288 miles with \$80.
3. (a) Concentration =
So, the salt concentration of the sea water is about 0.0292 pound per gallon.

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- (b) We assume that adding a few pounds of salt to 70 gallons of water will not significantly increase the volume of the solution. So, if we let x be the amount of salt to be added, then we want

or $x = 70(0.0292) = 2.044$

So, we should add about 2 pounds of salt.

5. (a) Amount of gas = gallons

- (b) The cost of the trip = $32(1.45) = 46.40$ dollars

7. (a) Amount of paint = gallons

- (b) Since 2 quarts of paint often cost just as much as 1 gallon of paint, I would buy 5 gallons of paint. So, the cost will be $5(28) = 140$ dollars, and so I would allocate \$140.

10. (a) Sale price = dollars

- (b) Let x be the purchase price by the owner of the service station. Then, . Solving the equation, we have . So, the owner paid \$42.86 for the tire.

- (c) Profit = $48 - 42.86 = 5.14$ dollars. So, the owner made the profit of \$5.14.

Exercises 2.3

1. (a) Average of the 5 quizzes = .

- (b) Average of the 8 quizzes =

- (c) Let x = the average of the next 4 quizzes. Then,

Solving this equation, we obtain $x = 95.05$. So, he must get the average of at least 95 for the next 4 quizzes.

- (d) Let x = the average of the next 4 quizzes. Then,

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Solving this equation, we get $x = 106$. So, he has to get the average of 106 for the next 4 quizzes. But if the maximum score for each quiz is 100, then it is impossible for him to raise his average to 92.

(e) Let N = the number of quizzes he needs. Then,

Solving this equation, we obtain $N = 11.2$. So, he needs more than 11 quizzes, or 12 quizzes, to raise his average to 92. (Eleven quizzes are not enough because when we compute his quiz average with $N = 11$, we get 91.94736842, which is below 92.)

3. (a) Average price = dollars.

So, the average price of the premium gas was \$1.54.

(b) Her expected monthly expense = dollars.

4. (a) The average daily balance for the 1st two days = dollars.

(b) The average daily balance for the 1st four days = dollars.

(d) The average daily balance for the 1st 10 days =
= dollars

(e) The average daily balance for the month =
= dollars

(f) The amount of interest = dollars. So, the amount of interest for the month of June was \$11.39.

6. (a) His GPA =

(c) Her GPA =

(d) She will get the maximum GPA if she gets straight A's in her senior year. So,

her maximum cumulative GPA =

So, her maximum GPA at the end of her senior year will be 3.7.

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- (e) Let x be the minimum GPA for the semester to raise his GPA to 3.5. Then,

Solving this equation, we get $x = 3.9$.

So, he has to get at least 3.9 for the semester to raise his GPA to 3.5.

- (g) Let N be the number of credits he needs. Then,

Solving this equation, we have $N = 33.75$. So, he needs 34 credits to raise his GPA to 3.5.

9. (a) Salt concentration of the new solution = grams/liter

- (b) Let x = the amount of water he should add. Then,

Or

Solving this equation, we get So, he should add about 2.67 liters of water to 2 liters of the original solution.

- (c) Let x = the amount of the solution to be replaced with water. Then, we will be mixing liters of the original solution and x liters of water to get the new solution whose salt concentration is 4 grams per liter. So,

Solving this equation, we get . So, we should take out about 34.3 liters of the solution and put back 34.3 liters of water.

Exercises 3.1

8. **Answers to Selected Problems**

(In each case, find the solution of the system and check your solution.)

k. Check your answer yourself.

Exercises 3.2

1. (a) The total receipt from the admission was \$1875.
(b) 348 students and 87 nonstudents attended the concert.

3. (a) The total receipt from the party was \$1190.
(b) 87 company employees and 43 guest attended the party.

5. (a) The resulting solution is 32.5% hydrochloric acid.
(b) The student should mix $166\frac{2}{3}$ cc of the 10% solution and $333\frac{1}{3}$ cc of the 40% solution.
(c) The student should mix 75 cc of the 40% solution and 75 cc of water.

7. \$70,000 should be kept in the Type A account and \$30,000 should be kept in the Type B account.

9. 187.5 pounds of Kona coffee and 112.5 pounds of Guatemalan coffee should be mix to fill the order.

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Exercises 4.1

1. (Expand the following products and simplify:)

3. (Expand the following products and simplify:)

(f)

5. (Expand the products and make observations:)

Exercises 4.2

1. (Factor the following expressions:)

2. (Factor the following expressions:)

3. (Factor the following expressions as completely as possible.)

10.

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4. (Factor the following expressions:)

Exercises 4.3

1. (Simplify the following expressions:)

Exercises 4.4

(Simplify the following expressions as far as possible:)

(o)

Exercises 4.5

1. (Simplify the following expressions as far as possible:)

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2. (Simplify the following expressions as far as possible:)

3. (Simplify the following expressions:)

Exercises 5.1

12.

Answers to Selected Problems

1. (Find the solution of each of the following equations:)

(o) The equation has no solution because $k = 3$ cannot be a solution of the equation since $k = 3$ makes the denominators equal to 0.

2. (Find the solution of each of the following equations:)

Exercises 5.2

(Solve each of the following equations for the indicated variable:)

Exercises 6.1

1. (a) The area of the parallelogram =
(b) The area of the triangle =
(c) The area of the triangle =
(d) The area of the trapezoid =
2. (a) Area of
(b) Area of

Answers to Selected Problems

13.

3. (a) , and so,
Area of
, and so,

(b) and , and so,
Area of
Area of

4. (a) Area of
Area of
Area of
Area of
(b) Area of EFGH =

6. (a) Area of .

(b) Area of trapezoid ABCD =
=
= =

9. (a) Area of the larger circle =
Area of the smaller circle =
(b) The area of the larger circle =
So, the area of the larger circle is 4 times the area of the
smaller circle.
(c) Area of the region =

10. (a) Area of ACBD =
=
=
=
=
(b) Area of the region =

13. (a) Area of ABFG =
Area of GFHI =
Area of IHJK =
Area of KJCD =
(b) (i) Area of ABCD =
(ii) Area of ABCD =
(c) Area of ABCD =
=
=

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14. (a)

Height =

Area of

Area of

Similarly,

Area of

Area of

So, the area of each of the triangles is equal to 20 square inches.

(b) Area of

=

=

Similarly,

Area of

Area of

Area of

Exercises 6.2

1.

2. (a) Let x be the length of one side of the square. Then,

ft.

So, one side of the square is feet or about 14.14 feet.

(b) The area of one of the 4 crescents =

So, the area of one crescent is about .

3. Let h be the height of the triangle. Then, using triangle CAD,

from which we find that

So,

area of

=

6. Think of the figure being formed by cutting out the isosceles triangle having the base of and the other two sides of each. We

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have to compute the height of the isosceles triangle first. The height turns out to be $\frac{\sqrt{3}}{2}$. So, area of the figure = $\frac{\sqrt{3}}{2}$.

7. Hint: The regular hexagon can be divided into six equilateral triangles.

10. (a)

(b) To compute the areas of the equilateral triangles, we need to know the heights. Let h_1 be the height of the equilateral triangle with AB as one side. Then, from the figure and using Pythagorean Theorem,

from which we obtain $h_1 = \frac{\sqrt{3}}{2}$. So,

Similarly, we find that the height of the equilateral triangle with AC as one side is $h_2 = \frac{\sqrt{3}}{2}$, and the height of the equilateral triangle with BC as one side is $h_3 = \frac{\sqrt{3}}{2}$, and that

To compare h_1 and h_2 , we express them in the decimal form to the limit of the accuracy of the calculator:

$$\begin{aligned} h_1 &= 0.8660254 \\ h_2 &= 0.8660254 \end{aligned}$$

So, we have $h_1 = h_2$.

(c)

Again,

(d) We have to find the sides of the isosceles right triangle with the side AB as the hypotenuse. Let x be one side. Then,

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from which we find that $\frac{a}{c} = \frac{1}{\sqrt{2}}$. So,

Similarly, we find that one side of the isosceles right triangle with AC as the hypotenuse is $\frac{a}{\sqrt{2}}$, and one side of the isosceles right triangle with BC as the hypotenuse is $\frac{a}{\sqrt{2}}$. So,

Thus again

Exercises 7.1

(Solve the following quadratic equations by factoring:)

Exercises 7.2

(Solve the following quadratic equations by extracting roots:)

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Exercises 7.3

(Solve the following quadratic equations by the most effective method.)

Exercises 8.1

2. (a)
(b)
(c) or
(d)
(e) or or
(f) or or

3. (a)

x	y
0	30
1	30.15
2	30.30
3	30.45
4	30.60
5	30.75

- (b)
(c) The cost of renting the car for the day is \$42.
(d) Solving the equation , we obtain . So, he can drive 280 miles.
5. (a)
(b) Make the tables of values for C, F, and yourself and sketch the graph.
(c) Eventually becomes greater than F because so that increases faster than F.

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- (d) We solve the equation and obtain . So, when the temperature is 10 degrees centigrade, the two formulas give the same Fahrenheit temperature.
- (e) F differs from by at most 3 degrees Fahrenheit when the temperature is between degrees Centigrade and 25 degrees Centigrade. So, gives "acceptable" values when the temperature is between degrees Centigrade and 25 degrees Centigrade.

Exercises 8.2

- 2. (a)
- (c)
- (e) or

3. (b)

x	T
19,450	2917.50
19,550	2945.50
19,650	2973.50
19,750	3001.50
19,850	3029.50

- (b) or
- (c) Jim's tax was \$4,275.50.
- (d) We solve the equation and obtain . So, Jill's taxable income was .

5. (a)

V	T
50,000	0
51,000	12
52,000	24
53,000	36

- (b)
- (c) The property tax is \$1,560 .

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19.

(d) We solve the equation and obtain . So, his property was assessed at .

Exercises 9.1

(a)

(b) or

(c) or

(d)

(e) = 1

(f) = 243

(g)

(h) or

(i)

(j)

(k) or

Exercises 9.2

1. (a)

= or

(b)

(c)

(d)

(e)

(f)

(g)

(i)

(l)

2. (a) 1 light-year is about miles.
(b) It takes about 8.3 minutes for the light to reach the Earth.
3. (a) The speed of the Earth is about 29,900 meters per second.
(b) The speed of the Earth is about 66,800 miles per hour.
(We know the destructive effect of two cars colliding head on traveling at 60 miles per hour. One can just imagine what would happen when an asteroid of the size of an island wanders into the path of the Earth. The catastrophic effect caused by such a collision is, according to one theory, the cause of the mass extinction of dinosaurs.)
(c) The speed of the Earth is about 98,000 feet per second.
4. (a) The radius of the Earth is about 4,000 miles.
(b) The circumference of the Earth is about 25,000 miles.
(c) It takes about 95 days.
(It is said that if Columbus knew the true distance around the Earth, he would not have undertaken his voyage. Columbus and ancient learned people knew that the Earth was round, and Eratosthenes (276 B.C. - 194 B.C.) had computed the circumference of the Earth to be about 25,000 miles. However, by Columbus time, somehow this knowledge was lost and Columbus far underestimated the size of the Earth. The above figure 11 miles per hour was about the speed of his ship.)
5. The total length of 1.3 trillion dollars worth of 10 dollar bills is about meters, so that would go into about 26.5 times. So, his statement was an understatement.
6. If it were possible to stack up 1.3 trillion dollars worth of 10 dollar bills in one pile, it would reach the height of 8073 miles.

Exercises 9.3

- (a) =
(b) =
(c) =
(d) =
(e) =

Answers to Selected Problems

21.

(f) =

(g) =

(h) =

(i) =

(j) =

(k) =

(l) =

(m) =

(n) =

(o) =

(p) = 2

(r) =

(s) =

(t) =

(u) =