**Guided Practice**

**Problems : Calculating Ratios**

1. Jack is pulling cable for an underground job in a city. The crew is using cable-pulling lubricant to assist in the pull and not damage the cable. Jack has used 5 gallons of lubricant for the first 100 feet of cable pulled. What is the ratio for feet of cable pulled to the gallons of lubricant used expressed in lowest terms?

A. 50 ft of cable to 1 gallon of lubricant

B. 100 ft of cable to 1 gallon of lubricant

C. 20 ft of cable to 1 gallon of lubricant

D. 500 ft of cable to 1 gallon of lubricant

2. Faith is clearing brush around utility poles and has mixed 640 ounces of gas with 40 ounces of oil in a trimmer’s 2-cycle motor. What is the ratio of gas to oil expressed in lowest terms?

A. 16:1 oz

B. 1:16 oz

C. 1:8 oz

D. 8:1 oz

3. Ken’s crew has just finished installations for a new subdivision. There were 39 new customers and the crew had to install 13 fuses. What is the ratio of customers to fuses expressed in lowest terms?

A. 39 customers to 13 fuses

B. 26 customers to 1 fuse

C. 5 customers to 1 fuse

 D. 3 customers to 1 fuse

**Calculating Direct Proportions**

4. Kim is determining how many discs an insulator must have for a given voltage. The engineering calculation estimate indicates that for every 10 kV of voltage, the insulator must have 1 insulating disc. If the voltage of the system Kim is working on is 120 kV, how many discs must the insulator have for this voltage?

A. 11 discs

B. 10 discs

C. 12 discs

D. 20 discs

5. Alex is sloping a trench for a directed buried electrical line installation. For every 1 foot of depth, the slope of the trench side walls must be at least 1 1/2 feet back. If the trench is 10 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 12 ft. of slope

B. 10 ft. of slope

C. 15 ft. of slope

D. 10 1/2 ft. of slope

**Independent Practice**

Calculating Ratios

6. Jane is placing cones for a work zone around a new gas pipe installation. The site requires 5 cones for every 75 feet of the work zone. What is the ratio of cones to the length of the work zone expressed in lowest terms?

A. 1 cone to every 15 ft

B. 1 cone for every 10 ft.

C. 15 cones for every 75 ft.

D. 1 cone for every 7 1/2 ft.

7. Hank needs to pump out a trench that has filled with rain water. The portable gas pump runs for 3 hours and uses 6 gallons of gas. What is the ratio of gas use to hours of pump operation expressed in lowest terms?

A. 1 gallon of gas for 2 hours of pump operation

B. 1 gallon of gas for 1/2 hour of pump operation

C. 1 gallon of gas for 3/4 hour of pump operation

D. 3 gallons of gas for 6 hours of pump operation

8. “Hi, Laura. How are we doing with the outage in the Thornbrook neighborhood?” Denise asks Laura, a gas dispatcher.

“I was just getting ready to call in the gas distribution mechanics,” responds Laura. “We expect the gas system to be repaired within the next 45 minutes.”

“Sounds good. I want all 150 customers relit within an hour of the gas system’s repair.”

Laura knows from experience that 1 mechanic can relight 10 houses in an hour. How many gas mechanics need to come in to restore all the customers within an hour after the system is repaired?

A. 10 mechanics

B. 15 mechanics

C. 5 mechanics

D. 30 mechanics

9. Darron is sloping a trench for a gas pipeline installation. For every 5 feet deep, the slope of the trench side walls must be at least 3/4 feet back. If the trench is 15 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 1 1/2 ft. of slope

B. 3 3/4 ft. of slope

C. 2 1/4 ft. of slope

D. 3/4 ft. of slope

10. Jane is calculating the loads of fill she needs to fill a trench where a new pipe was installed. For every 8

feet of trench, Jane needs 6 tons of fill. How many tons of fill does Jane need for a 24-foot trench?

A. 12 tons of fill

B. 6 tons of fill

C. 18 tons of fill

D. 8 tons of fill

Exit Slip Activity: Create your own proportion word problem. You could use our workplace problems as an example, or choose a life application such as doubling or reducing a recipe. Write the problem out and solve it. Then label your ratios, proportions, cross-multiplying, and unknown variable to demonstrate your understanding of these terms.

**Instructor Key: Guided Practice Problems : Calculating Ratios**

1. Jack is pulling cable for an underground job in a city. The crew is using cable-pulling lubricant to assist in the pull and not damage the cable. Jack has used 5 gallons of lubricant for the first 100 feet of cable pulled. What is the ratio for feet of cable pulled to the gallons of lubricant used expressed in lowest terms?

A. 50 ft of cable to 1 gallon of lubricant

B. 100 ft of cable to 1 gallon of lubricant

**C. 20 ft of cable to 1 gallon of lubricant**

D. 500 ft of cable to 1 gallon of lubricant

100 ft. of cable

 5 gallons

20/1 or 20:1 or 20 to 1

2. Faith is clearing brush around utility poles and has mixed 640 ounces of gas with 40 ounces of oil in a trimmer’s 2-cycle motor. What is the ratio of gas to oil expressed in lowest terms?

**A. 16:1 oz**

B. 1:16 oz

C. 1:8 oz

D. 8:1 oz

640 oz. of gas

 40 oz. of oil

16/1 or 16:1 or 16 to 1

3. Ken’s crew has just finished installations for a new subdivision. There were 39 new customers and the crew had to install 13 fuses. What is the ratio of customers to fuses expressed in lowest terms?

A. 39 customers to 13 fuses

B. 26 customers to 1 fuse

C. 5 customers to 1 fuse

 **D. 3 customers to 1 fuse**

39 customers

13 fuses

3/1 or 3:1 or 3 to 1

**Calculating Direct Proportions**

4. Kim is determining how many discs an insulator must have for a given voltage. The engineering calculation estimate indicates that for every 10 kV of voltage, the insulator must have 1 insulating disc. If the voltage of the system Kim is working on is 120 kV, how many discs must the insulator have for this voltage?

A. 11 discs

B. 10 discs

**C. 12 discs**

D. 20 discs

 1 disc = d\_\_\_

10 kV of voltage 120 kV of voltage

10d=120

Divide by 10 on both sides.

d=12 discs

5. Alex is sloping a trench for a directed buried electrical line installation. For every 1 foot of depth, the slope of the trench side walls must be at least 1 1/2 feet back. If the trench is 10 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 12 ft. of slope

B. 10 ft. of slope

**C. 15 ft. of slope**

D. 10 1/2 ft. of slope

1 ft. = 10 ft.

3/2 ft. s

(3/2)10 = 1(s)

15 = s

**Independent Practice**

Calculating Ratios

6. Jane is placing cones for a work zone around a new gas pipe installation. The site requires 5 cones for every 75 feet of the work zone. What is the ratio of cones to the length of the work zone expressed in lowest terms?

**A. 1 cone to every 15 ft.**

B. 1 cone for every 10 ft.

C. 15 cones for every 75 ft.

D. 1 cone for every 7 1/2 ft.

5 cones

 75 ft.

1/15 or 1:15 or 1 cone to every 15 ft.

7. Hank needs to pump out a trench that has filled with rain water. The portable gas pump runs for 3 hours and uses 6 gallons of gas. What is the ratio of gas use to hours of pump operation expressed in lowest terms?

A. 1 gallon of gas for 2 hours of pump operation

**B. 1 gallon of gas for 1/2 hour of pump operation**

C. 1 gallon of gas for 3/4 hour of pump operation

D. 3 gallons of gas for 6 hours of pump operation

6 gallons of gas

 3 hours

2 gallons of gas to every one hour = 1 gallon of gas for every ½ hour of pump operation

8. “Hi, Laura. How are we doing with the outage in the Thornbrook neighborhood?” Denise asks Laura, a gas dispatcher.

“I was just getting ready to call in the gas distribution mechanics,” responds Laura. “We expect the gas system to be repaired within the next 45 minutes.”

“Sounds good. I want all 150 customers relit within an hour of the gas system’s repair.”

Laura knows from experience that 1 mechanic can relight 10 houses in an hour. How many gas mechanics need to come in to restore all the customers within an hour after the system is repaired?

A. 10 mechanics

**B. 15 mechanics**

C. 5 mechanics

D. 30 mechanics

1 mechanic = m\_\_

10 houses 150 houses

1(150) =10m

Divide by 10 on both sides.

15 = m

9. Darron is sloping a trench for a gas pipeline installation. For every 5 feet deep, the slope of the trench side walls must be at least 3/4 feet back. If the trench is 15 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 1 1/2 ft. of slope

B. 3 3/4 ft. of slope

**C. 2 1/4 ft. of slope**

D. 3/4 ft. of slope

5 ft. = 15 ft.

¾ ft. b

(3/4)15 =5b

45/4 = 5b

Divide both sides by 5. When dividing with fractions, multiply by the inverse.

(45/4)/5 = b

(45/4)(1/5)=b

9/4=b

2 ¼ =b

10. Jane is calculating the loads of fill she needs to fill a trench where a new pipe was installed. For every 8

feet of trench, Jane needs 6 tons of fill. How many tons of fill does Jane need for a 24-foot trench?

A. 12 tons of fill

B. 6 tons of fill

**C. 18 tons of fill**

D. 8 tons of fill

 8 ft. = 24 ft.

6 tons t

8t=24(6)

8t=144

Divide both sides by 8.

t=18 tons

**Quiz: Solving Problems Using Proportions**

1. Kyle’s crew has just finished installations for a new subdivision. There were 40 new customers and the crew had to install 10 fuses. What is the ratio of customers to fuses expressed in lowest terms?

A. 40 customers to 4 fuses

B. 40 customers to 10 fuses

C. 4 customers to 1 fuse

 D. 10 customers to 4 fuses

2. Simone is determining how many discs an insulator must have for a given voltage. The engineering calculation estimate indicates that for every 15 kV of voltage, the insulator must have 1 insulating disc. If the voltage of the system Kim is working on is 120 kV, how many discs must the insulator have for this voltage?

A. 2 discs

B. 4 discs

C. 10 discs

D. 8 discs

3. Pedro is sloping a trench for a directed buried electrical line installation. For every 1 foot of depth, the slope of the trench side walls must be at least 1 1/2 feet back. If the trench is 20 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 25 ft. of slope

B. 30 ft. of slope

C. 32 ft. of slope

D. 35 ft. of slope

4. Judy is calculating the loads of fill she needs to fill a trench where a new pipe was installed. For every 8

feet of trench, Jane needs 6 tons of fill. How many tons of fill does Jane need for a 48-foot trench?

A. 30 tons of fill

B. 32 tons of fill

C. 34 tons of fill

D. 36 tons of fill

**Answer Key:**

1. Kyle’s crew has just finished installations for a new subdivision. There were 40 new customers and the crew had to install 10 fuses. What is the ratio of customers to fuses expressed in lowest terms?

A. 40 customers to 4 fuses

B. 40 customers to 10 fuses

**C. 4 customers to 1 fuse**

 D. 10 customers to 4 fuses

40 customers/10 fuses

Reduce the fraction (ratio) by dividing by 10.

4/1 or 4:1 or 4 to 1

2. Simone is determining how many discs an insulator must have for a given voltage. The engineering calculation estimate indicates that for every 15 kV of voltage, the insulator must have 1 insulating disc. If the voltage of the system Kim is working on is 120 kV, how many discs must the insulator have for this voltage?

A. 2 discs

B. 4 discs

C. 10 discs

**D. 8 discs**

15 kV = 120 kV Cross multiply.

 1 x

120=15x Divide both sides by 15 to isolate x.

120/15=8=x

x=8 discs

3. Pedro is sloping a trench for a directed buried electrical line installation. For every 1 foot of depth, the slope of the trench side walls must be at least 1 1/2 feet back. If the trench is 20 feet deep, how far back does the crew need to slope the trench so they can work the installation safely?

A. 25 ft. of slope

**B. 30 ft. of slope**

C. 32 ft. of slope

D. 35 ft. of slope

1 ft. = 20 ft. Cross-multiply.

 3/2 x

30 ft. = x

4. Judy is calculating the loads of fill she needs to fill a trench where a new pipe was installed. For every 8

feet of trench, Jane needs 6 tons of fill. How many tons of fill does Jane need for a 48-foot trench?

A. 30 tons of fill

B. 32 tons of fill

C. 34 tons of fill

**D. 36 tons of fill**

8 ft = 48 ft. Cross-multiply.

 6 x

288=8x Divide both sides by 8.

288/8=36=x