Math Review

Scenarios and Problems
Student Guide

Module 6: Operations with Percents

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Operations with Percents (Lineworker)
Scenario

"We are going at a pretty good pace, huh, Matt?" Jill, a lineworker, says to her supervisor as she eats her lunch.

Jill and Matt are part of a line crew pulling wire for an overhead system upgrade.

"Yes, we are. Looks like we pulled 160 feet of wire."

"How many total feet are we pulling for this job?"

"Total is 350 feet, so we still have a little ways to go."

What percentage of wire do Matt and his crew still have to pull for the overhead system upgrade?

A. 45.7%
B. 65.6%
C. 54.3%
D. 19%

Matt and his crew are pulling wire for an overhead system
Courtesy DOL, image is in the public domain

Problems
Finding the Unknown Percent

Matt and the line crew are pulling wire for an overhead system upgrade. They have 220 feet of wire to pull. After the first two hours, they had pulled 60 feet. Sixty feet is what percentage of the entire job?

A. 45%
B. 27.3%
C. 36.6%
D. 30%

Cathy is restocking the line trucks. She has 150 wedge connectors and she is required to put 30 wedge connectors on each truck. Thirty is what percentage of 150?

A. 20%
B. 6%
C. 5%
D. 15%

Chin and his crew are adding oil to the transformers in a substation. Chin had a 55-gallon drum of oil when he started the job. His crew has added 5 gallons each to 5 transformers for a total of 25 gallons of oil. What percentage is 25 gallons of the 55-gallon barrel?

A. 45.5%
B. 54.5%
C. 22%
D. 50%

Finding the Unknown Part

Jack and the crew are doing pole inspections. They have completed 25% of the 60 poles the crew has to inspect. How many poles has the crew inspected?

A. 30 poles
B. 15 poles
C. 45 poles
D. 25 poles

Kerri and her crew are setting a new pole. The angle of the boom on the pole setting truck is at 45°, which limits the ability of the crane to pick up 60% of the entire 4,000-pound pole weight. What is the weight the truck can lift with the boom at a 45° angle?

A. 1,600 lbs
B. 1,800 lbs
C. 2,400 lbs
D. 4,000 lbs

Laura and her line crew are pulling wire for a new subdivision. The spool on the truck has 600 feet of primary copper wire. The crew used 28% of the spool in the morning. How many feet of wire did the crew use?

A. 432 ft
B. 214 ft
C. 386 ft
D. 168 ft

Finding the Unknown Whole

Jack and his crew have to do thermal inspections on the connectors in a business development. The crew has completed 35%, or 63 connectors, as of their lunch break. How many total connectors does the crew have to inspect on this day?

A. 180 connectors
B. 103 connectors
C. 117 connectors
D. 85 connectors

Yolanda is performing hot stick inspections. She found 5%, or 8 sticks, either needed an expired inspection label or had cracks that would impact the safety of the crew. How many total hot sticks has Yolanda inspected?

A. 100 sticks
B. 160 sticks
C. 40 sticks
D. 120 sticks

Tom and his line crew are looking for a fault in a direct buried cable leading to a home. The crew has completed 30%, or 36 feet, using the pin-pointer fault detection equipment. How many feet of the total cable will the crew be inspecting?

A. 61 ft
B. 108 ft
C. 51 ft
D. 120 ft

Operations with Percents (Plant Operator)
Scenario

"What are we raising the flow power to at the Hinkson Creek substation?" Jerry asks Chin, a plant operator.

"Looks like we are bringing it up to 5.4 Megawatts from 2.0 Megawatts this afternoon," Chin responds.

"Is that a bigger increase than yesterday afternoon?"

"We increased power 150% to Hinkson Creek yesterday."

What percentage increase in today's power flow would Chin report to Jerry for the Hinkson Creek substation?

Chin is raising flow power to a substation
Courtesy OSHA, image is in the public domain

A. 270%
B. 27%
C. 127%
D. 340%

Problems
Finding the Unknown Percent

Chin has been asked to raise the plant spinning reserve to at least 200 MW to meet anticipated demand during the hot afternoon peak. His current spinning reserve is 120MW. By what minimum percentage must Chin increase spinning reserve?

A. 270%
B. 180%
C. 167%
D. 80%

In order to comply with a request to raise the plant spinning reserve to at least 200 MW, Chin will have to bring a 100 MW steam turbo-generator on line that will raise the plant's actual spinning reserve from the current 120 MW to 220 MW. By what actual percentage will Chin be increasing the spinning reserve?

A. 270%
B. 183%
C. 83.3%
D. 40%

Howard, a plant operator, has been asked to reduce his plant's output from 100%, full power at 140 MW, to 120 MW as a large customer goes off-line for the weekend. What is the plant's new output in percent?

A. 86%
B. 14%
C. 108%
D. 120%

Bart, a plant operator, has been asked to dispatch 150 Megawatt-hours (MW-h) of energy to the transmission inter-tie substation during his current shift. Thus far, he has dispatched 90 MW-h. What percentage of the total energy remains to be dispatched?

A. 25%
B. 60%
C. 167%
D. 40%

Finding the Unknown Part

Bart has been asked to dispatch 200 Megawatt-hours (MW-h) of energy to the transmission inter-tie substation during his current shift. Thus far, he has dispatched 30% of this amount. How much energy in MW-h remains to be dispatched?

A. 30 MW-h
B. 70 MW-h
C. 140 MW-h
D. 170 MW-h

Chin, a plant operator, has been asked to adjust the flow of power from the plant to the Hinkson Creek substation to 4.5 Megawatts (MW). If Hinkson Creek is currently drawing 40% of that amount, how much additional power in MW must Chin feed to Hinkson?

A. 2.7 MW
B. 4.10 MW
C. 1.80 MW
D. 2.75 MW

Chin has been asked to raise the plant spinning reserve to at least 250 MW to meet anticipated demand during the hot afternoon peak. His current spinning reserve is 61% of this minimum amount. What is the current level of the spinning reserve in MW?

A. 189 MW
B.152.50 MW
C. 97.50 MW
D. 80 MW

As the afternoon temperature and load both continue to rise, Chin realizes that he needs to rapidly increase the plant's current spinning reserve by bringing the combustion gas turbine peaking unit online. The peaking unit will increase the current 60 MW of spinning reserve by an additional 130%. What additional spinning reserve in MW does the 130% represent?

A. 78 MW
B. 130 MW
C. 138 MW
D. 190 MW

Finding the Unknown Whole

As the afternoon temperature and load both continue to rise, Chin realizes that he needs to rapidly increase the plant's current spinning reserve from 60 MW by an additional 120% by bringing the combustion gas turbine peaking unit online. What would the total spinning reserve become, if there are no load changes, as the combustion gas turbine is brought online?

A. 72 MW
B.120 MW
C. 132 MW
D. 180 MW

Ramon notes the addition of 200 gallons of #2 diesel fuel to back-up generator diesel A's storage tank raises the level indicated in its sight glass by 40%. What should he estimate to be the volume of A's tank?

A. 300 gallons
B. 400 gallons
C. 500 gallons
D. 600 gallons

Ramon notes the addition of 200 gallons of #2 diesel fuel to the back-up generator B's diesel storage tank raises the fuel gauge from 25% to 50% full. What should he estimate to be the volume of B's tank?

A. 250 gallons
B. 400 gallons
C. 550 gallons
D. 800 gallons

Operations with Percents (Pipefitter/Pipelayer/Welder)
Scenario

"That was a long day, huh, Tammy?" Lowell, a gas distribution mechanic, says to his supervisor Tammy after fusing gas pipes all day.

"Yes it was, and we still have a ways to go," Tammy says, looking at the work order for the neighborhood.

"How many fusions did we get done?"

"Looks like we finished up 30 today, and we have 200 total fusions to complete."

What percentage of the fusions does Tammy's crew still need to complete?

A. 15%
B. 70%
C. 65%
D. 85%

Tammy and Lowell are installing gas pipes in a residential neighborhood
Courtesy OpenStreetMap.org, image licensed under Creative Commons

Problems
Finding the Unknown Percent

Frank has to complete 30 feet of welding in order to connect 2 plates of steel together to cover a gas trench in a roadway. By 10 a.m., Frank has completed 8 feet. What percentage of the 30 feet has Frank completed?

A. 26.6%
B. 37.5%
C. 73.4%
D. 15%

Tammy and her gas distribution mechanics are completing fusions for gas pipes in a residential neighborhood. The crew has to complete 130 fusions to complete the entire neighborhood. After the first day, the crew had completed 20 fusions. What percentage of the fusions has the crew completed?

A. 35%
B. 26%
C. 15%
D. 42%

Wen is restocking the gas trucks. She has 150 pipe connectors and she is required to put 30 pipe connectors on each truck. What percentage of the 150 connectors is stocked on each truck?

A. 20%
B. 6%
C. 2%
D. 15%

Finding the Unknown Part

Gail and the gas crew have responded to a reported gas leak. In order to find the leak, the crew has to complete 60 bar holes around the house foundation. The crew completed 15% of the holes in the first 10 minutes of their work. How many holes did the crew complete in the first 10 minutes?

A. 3 holes
B. 9 holes
C. 5 holes
D. 33 holes

Mark is heating welding rods for the gas distribution crew laying a 10-inch steel gas main. Mark has 120 rods in the warming oven but he can only use 25% of the rods on this job. How many welding rods will Mark and the crew use?

A. 40 rods
B. 102 rods
C. 30 rods
D. 5 rods

Vinny is a welding inspector. He has inspected 40 welds and found 15% that have to be redone due to multiple welding issues. How many welds have to be redone?

A. 6 welds
B. 34 welds
C. 27 welds
D. 13 welds

Finding the Unknown Whole

Tammy and the gas crew have completed fusing 30 connectors on a residential assignment. If this represents 40% of all the connectors they have to complete, how many total connectors do Tammy and the crew have to complete?

A. 50 connectors
B. 42 connectors
C. 75 connectors
D. 70 connectors

Reggie is welding a steel plate to cover a trench in a roadway. Reggie has completed 15%, or 6 feet, of the total weld. How many total feet of weld does Reggie have to complete?

A. 40 ft
B. 90 ft
C. 60 ft
D. 25 ft

Iris is putting a new gas main down under a town road. The town crew is cutting the asphalt so the gas trench can be dug in the road. The town crew has cut 45 feet of the asphalt, which is only 15% of the entire length of the new gas line. How many total feet of asphalt need to be removed so the gas crew can begin digging the trench?

A. 675 ft
B. 333 ft
C. 300 ft
D. 630 ft