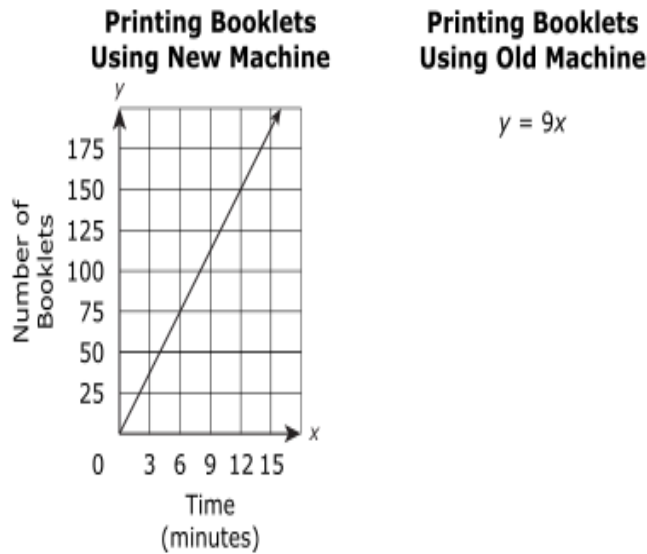


Math
Released Item 2016

Grade 8

Time Printing Booklets
VF655990

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues printing for an additional 14 minutes and completes the order.

What is the total number of minutes the new machine prints? Show or explain all your work.

Enter your answer and your work in the space provided.

Rubric

Score	Description
3	<p>Student response includes each of the following 3 elements.</p> <ul style="list-style-type: none"> • Computation component = 1 point <ul style="list-style-type: none"> ○ The student indicates that the new machine prints for 64 minutes. • Modeling component = 1 point <ul style="list-style-type: none"> ○ The student provides a correct process to determine unit rates for each machine. • Modeling component = 1 point <ul style="list-style-type: none"> ○ The student provides a correct process to determine the number of minutes the new machine prints. <p>Sample Student Response:</p> <p>"From the graph, the new machine prints 75 booklets in 6 minutes. This means that the new machine prints booklets at a rate of $75/6 = 12.5$ booklets per minute. From the equation, the old machine prints booklets at a rate of 9 booklets per minute."</p> <p>"Let x represent the number of minutes the old machine prints booklets. Then $x + 14$ minutes, the new machine prints a total of $12.5(x + 14)$ booklets.</p> <p>Since 1,250 booklets are printed, the equation $1,250 = 12.5(x + 14) + 9x$ represents this situation. The equation can be solved to determine x, the number of minutes the old machine prints.</p> $1,250 = 12.5(x + 14) + 9x$ $1,250 = 12.5x + 175 + 9x$ $1,075 = 21.5x$ $50 = x$ <p>So, the old machine prints for 50 minutes. Since the new machine prints for 14 minutes more than the old machine, the new machine prints for $50 + 14 = 64$ minutes."</p> <p>Notes:</p> <ul style="list-style-type: none"> • The student may show the equations without the verbal description. If equations are shown that represent valid modeling for the situation, credit should be awarded. • The student may receive a combined total of 2 points if the modeling processes are correct but he or she makes one or more computational errors resulting in an incorrect answer. • The student may receive a total of 1 point if he or she computes the correct answer but shows no work or insufficient work to indicate a correct modeling process.

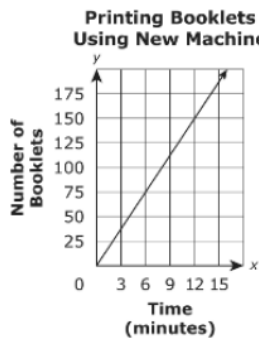
	The student may receive 1 point for modeling part 1 if the unit rates for each machine are not explicitly stated but are used correctly to determine the number of minutes either machine prints.
2	Student response includes 2 of the above elements.
1	Student response includes 1 of the above elements.
0	Student response is incorrect or irrelevant.

Anchor Set

A1 – A8

With Annotations

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

the new machine prints 12.5 booklets per minute. together they print 21.5 per minute. That means the new machine prints 175 magazines in the last 14 minutes.

$$1250 - 175 = 1075$$

$$\frac{1075}{21.5} = 50$$

$$50 + 14 = 64$$

The new printer printed for 64 minutes.

Annotation

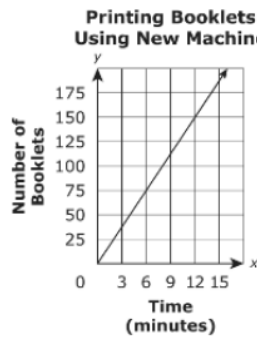
Anchor Paper 1

Score Point 3

This response receives full credit. It includes each of the three required elements:

- The correct number of minutes that the new machine prints is provided (64 minutes).
- The student provides the correct unit rates to print booklets for the old and new machines (the new machine prints 12.5 booklets per minute. together they print 21.5 per minute). Although the rate for the old machine is not explicitly stated, it is evident that the unit rate to print booklets for the old machine is 9 booklets per minute [$21.5 - 12.5 = 9$].
- A correct process to determine the number of minutes the new machine prints is provided (That means the new machine prints 175 magazines in the last 14 minutes. $1250 - 175 = 1075$, $\frac{1075}{21.5} = 50$, $50 + 14 = 64$).

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

New machine: $y = 12.5x$

Old machine: $y = 9x$

$$1250 = 9(x - 14) + 12.5x$$

$$1250 = 9x - 126 + 12.5x$$

$$1250 = 21.5x - 126$$

$$+126$$

$$1376 = 21.5x$$

$$\square \div 21.5$$

$$64 = x$$

$$\square$$

64 minutes

Annotation

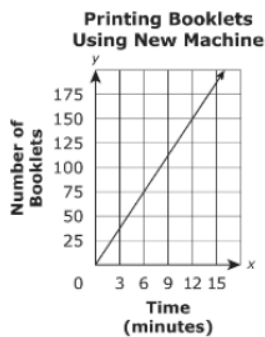
Anchor Paper 2

Score Point 3

This response receives full credit. It includes each of the three required elements:

- The correct number of minutes that the new machine prints is provided (64 minutes).
- The student provides the correct unit rates to print booklets for the old and new machines (9, 12.5).
Although the unit rates are not explicitly stated, they are determined when the student provides equations (New machine: $y = 12.5x$, Old machine: $y = 9x$) where it is clear that the coefficients of x are the unit rates and are being used in a correct process.
- A correct process to determine the number of minutes the new machine prints is provided ($1250 = 9(x - 14) + 12.5x$, $1250 = 9x - 126 + 12.5x$, $1250 + 126 = 21.5x - 126$, $1376 = 21.5x$, $64 = x$). This process is developed by letting x represent the number of minutes the new machine prints booklets.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

old *machine* = 9 booklets per min
 new *machine* = $12 \frac{1}{2}$ booklets per min.

$$12 \frac{1}{2} \square \times 14 = 175 \text{ booklets}$$

$1,250 - 175 = 1075$ booklets left to print

At a combined rate of $21 \frac{1}{2}$ booklets per min, they printed the other booklets in 50 min.

this means that the new printer printed for a total of 64 min.

Annotation

Anchor Paper 3

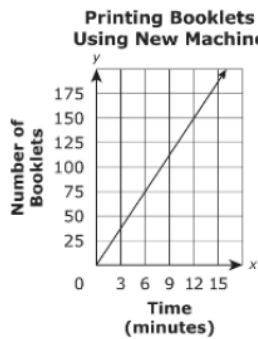
Score Point 2

This response receives partial credit. It includes two of the three required elements:

- The correct number of minutes that the new machine prints is provided (64 min.).
- The student provides the correct unit rates to print booklets for the old and new machines (old machine = 9 booklets per min, new machine = $12\frac{1}{2}$ booklets per min.).

The attempt to provide a process to determine the number of minutes the new machine prints is incomplete. The work or explanation for how (50 min.) was obtained is missing.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

64 minutes. I found that it takes the new printer 2 minutes to print 25 copies and the old one 2 minutes to print 18 copies. I added them to get 43 copies in 2 minutes, and multiplied it by 25 to get 1075 copies in 50 minutes. The new machine can make 175 copies in 14 minutes, so I added 1075, 175 and 50

Annotation

Anchor Paper 4

Score Point 2

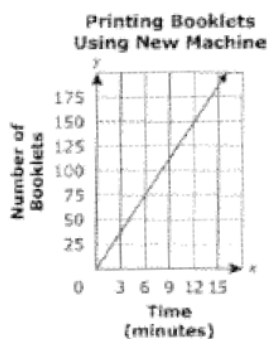
This response receives partial credit. It includes two of the three required elements:

- The correct number of minutes that the new machine prints is provided (64 minutes).
- The student provides the correct unit rates to print booklets for the old and new machines (it takes the new printer 2 minutes to print 25 copies [12.5] and the old one 2 minutes to print 18 copies [9]).

The attempt to provide a process to determine the number of minutes the new machine prints is incomplete.

The final statement (I added 1075, 175 and 50) makes it unclear how 64 was obtained.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

if the old machine prints 9 booklets every minute and the new machine prints 12.5 booklets every minute i can infer the old machine broke down at 50 minutes so $50 + 24 = 74$ so the new machine ran for 74 minutes

Annotation

Anchor Paper 5

Score Point 1

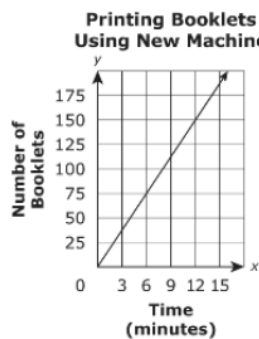
This response receives partial credit. It includes one of the three required elements:

- The student provides the correct unit rates to print booklets for the old and new machines (the old machine prints 9 booklets every minute and the new machine prints 12.5 booklets every minute).

The attempt to provide the number of minutes the new machine prints is incorrect (74 minutes).

The attempt to provide a process to determine the number of minutes the new machine prints is incomplete. (I can infer the old machine broke down at 50 minutes so $50 + 24 = 74$).

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$y = 9x$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

The new machine prints about 800 copies. I added up the unit rate of both machines $9 + 12.5$ and got 21.5. Then I divided that by 1,250 booklets and got 58.139. Then I multiplied that by 12.5 and got around 800.

Annotation

Anchor Paper 6

Score Point 1

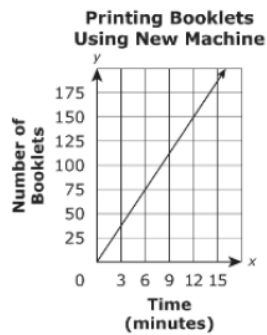
This response receives partial credit. It includes one of the three required elements:

- The student provides the correct unit rates to print booklets for the old machine and the new machine (9, 12.5).

There is no attempt to provide the number of minutes the new machine prints.

The attempt to provide a process to determine the number of minutes the new machine prints is incorrect (Then I divided that by 1,250 . . . and got around 800).

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

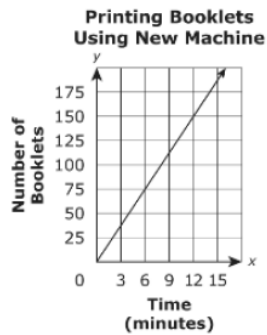
$$150 \div 12 = 12.5$$

$$1250 \div 12.5 = 100$$

the total number the new machine prints is 114 minutes.

Annotation
Anchor Paper 7
Score Point 0
<p>This response receives no credit. It includes none of the three required elements:</p> <p>The attempt to provide the number of minutes the new machine prints is incorrect (114 minutes).</p> <p>The attempt to provide the correct unit rates for the old machine and new machine is incomplete. The old machine is never addressed.</p> <p>The attempt to provide a process to determine the number of minutes the new machine prints is incorrect ($1250 \div 12.5 = 100$).</p>

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

The new printer printed 175 booklets in the 14 minutes.

$$1250 - 175 = 1075$$

$$\frac{1075}{2} = 537.5$$

$$\text{old printer} = \frac{537.5}{9} = 59.72$$

$$\text{new printer} = \frac{537.5}{12.5} = 43$$

$$59.72 + 43 = 102.72$$

it took the printers approximately 102 minutes, or 1 hour and 42 minutes.

Annotation

Anchor Paper 8

Score Point 0

This response receives no credit. It includes none of the three required elements:

The attempt to provide the number of minutes the new machine prints is incorrect (43).

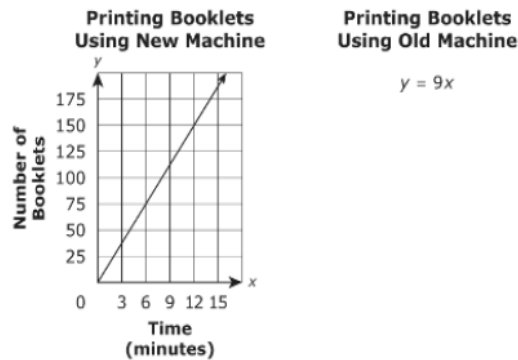
The attempt to provide the correct unit rates for the old machine and new machine is incorrect. When the student divides the remaining booklets to be printed (1075) by 2, the student assumes that each machine prints the same number of booklets regardless of the rate.

The attempt to provide a process to determine the number of minutes the new machine prints is incorrect ($\frac{1075}{2} \dots \frac{537.5}{12.5}$).

Practice Set P101 - P105

No Annotations Included

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.

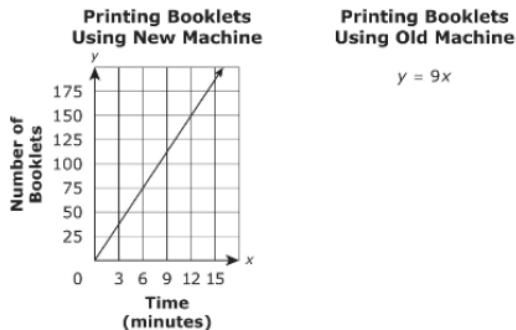


The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

29 total minutes. The old machine stops working so the new machine carries on printing for an additional 14 minutes. I added $15 + 14$ and got 29 minutes because that is the total minutes the new machine printed.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.

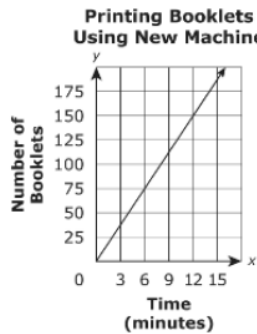


The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

I got 54 minutes because i found the amount of booklets the new printer could print, which was 12.5 booklets per minute. Then, i multiplied that number by 14 because that was the number the new printer had to print without the old printer. I got 175, and then i subtracted 175 by 1250, and got 1075, which is the amount of booklets printed before the old machine died. Next i set up the equation $9x + 12.5x = 1075$ because it would tell me the time both printers were printing. I got 50 minutes. Finally i added 14 to 50 and got my answer 54 minutes.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

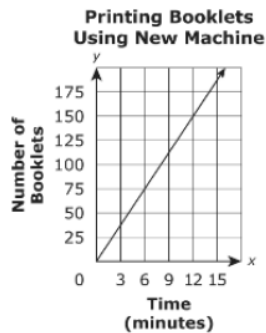
$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

64minutes is the total for the new machine.

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

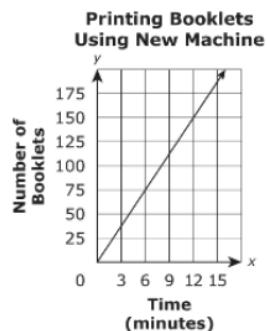
$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

the new machine prints for 64 minutes, i know this because the new machine produces booklets at 12.5 a minute and it already ran for 14 minutes which is 175 booklets. Also if the order is 1250 booklets total you can already take away the 175 so they only have to make a combined total of 1075 booklets. the old machine produces 9 booklets a minute, if a add the two machines together than they produce 21.5 booklets a minute and $21.5 \times 50 = 1075$ so thats a total of the new machine runing for $50 + 14$ minutes, so a total of 64 minutes

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



Printing Booklets Using Old Machine

$$y = 9x$$

The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues

What is the total number of minutes the new machine prints? Show or explain all your work.

The new machine makes 12.5 booklets per minute. The old machine makes 9 booklets per minute.

Practice Set

Paper	Score
P101	0
P102	2
P103	1
P104	3
P105	1