

MORE PRACTICE: WORD PROBLEMS

Math 10 · Mr. Merrick · February 4, 2026

1. A coffee shop blends two types of beans. One bean costs \$9 per kg and the other costs \$15 per kg. How many kilograms of each should be mixed to make 80 kg of coffee that sells for \$12 per kg?

Let x and y be the kilograms of each type. $x + y = 80$, $9x + 15y = 960$. Solution: $(x, y) = (40, 40)$.

2. A delivery truck travels part of a trip at 70 km/h and the rest at 90 km/h. The total distance is 420 km and the total driving time is 5.5 hours. How long did the truck travel at each speed?

Let t_1 and t_2 be the times. $t_1 + t_2 = 5.5$, $70t_1 + 90t_2 = 420$. Substitute $t_2 = 5.5 - t_1$: $70t_1 + 90(5.5 - t_1) = 420 \Rightarrow -20t_1 = -75$. Solution: $t_1 = 3.75$ h, $t_2 = 1.75$ h.

3. A lab technician mixes a 30% acid solution with a 70% acid solution to make 500 mL of a 54% solution. How much of each solution is used?

Let $x + y = 500$, $0.30x + 0.70y = 270$. Solution: $x = 200$, $y = 300$.

4. A student travels 9 km to school. She cycles part of the way at 12 km/h and walks the rest at 4 km/h. The total travel time is 1.25 hours. How far does she cycle?

$\frac{x}{12} + \frac{9-x}{4} = 1.25$. Multiply by 12: $x + 3(9 - x) = 15 \Rightarrow -2x = -12$. Solution: $x = 6$ km.

5. A snack mix contains almonds, cashews, and peanuts. Almonds cost \$18 per kg, cashews \$14 per kg, and peanuts \$6 per kg. A total of 50 kg of mix is made and sold for \$12 per kg. There are twice as many kilograms of peanuts as almonds.

How many kilograms of each nut are used?

$$a + c + p = 50$$

$$18a + 14c + 6p = 600$$

$$p = 2a$$

Substitute $p = 2a$: $a + c + 2a = 50 \Rightarrow c = 50 - 3a$. Then $18a + 14(50 - 3a) + 6(2a) = 600 \Rightarrow -12a = -100 \Rightarrow a = \frac{25}{3}$. So $p = \frac{50}{3}$ and $c = 25$. Solution: $(a, c, p) = (\frac{25}{3}, 25, \frac{50}{3})$.

6. A road trip is made in three stages. The driver travels part of the trip at 50 km/h, part at 90 km/h, and part at 60 km/h. The total distance is 480 km and the total driving time is 7 hours. The time spent driving at 90 km/h is twice the time spent driving at 50 km/h.

How long is each stage of the trip?

$$x + y + z = 7$$

$$50x + 90y + 60z = 480$$

$$y = 2x$$

Substitute $y = 2x$: $x + 2x + z = 7 \Rightarrow z = 7 - 3x$. Then $50x + 90(2x) + 60(7 - 3x) = 480 \Rightarrow 50x + 420 = 480 \Rightarrow x = 1.2$. So $y = 2.4$ and $z = 3.4$. Solution: $(x, y, z) = (1.2, 2.4, 3.4)$.

7. A movie theatre sells adult, youth, and senior tickets. Adult tickets cost \$14, youth tickets \$10, and senior tickets \$9.

On one evening:

- 320 tickets were sold
- The total revenue was \$3760
- Twice as many adult tickets were sold as senior tickets

How many tickets of each type were sold?

$$a + y + s = 320$$

$$14a + 10y + 9s = 3760$$

$$a = 2s$$

Substitute $a = 2s$: $2s + y + s = 320 \Rightarrow y = 320 - 3s$. Revenue: $14(2s) + 10(320 - 3s) + 9s = 3760 \Rightarrow 7s + 3200 = 3760 \Rightarrow s = 80$. So $a = 160$ and $y = 80$. Solution: $(a, y, s) = (160, 80, 80)$.

8. A system of equations modelling a real situation has the solution

$$(x, y, z) = (12, 8, 4).$$

Explain what each value could represent in:

- a mixture problem
- a travel problem
- a ticket-sales problem

Each value represents a quantity that satisfies all constraints of the situation, such as mass, time, or number sold.

9. A fundraiser sells three types of items: mugs, T-shirts, and hoodies. Mugs sell for \$8 each, T-shirts for \$15 each, and hoodies for \$35 each.

At the end of the event:

- A total of 140 items were sold
- The total revenue was \$2620
- The number of T-shirts sold was 20 more than the number of mugs sold

How many of each item were sold?

Let m, t, h represent mugs, T-shirts, and hoodies.

$$\begin{aligned}m + t + h &= 140 \\8m + 15t + 35h &= 2620 \\t &= m + 20\end{aligned}$$

Substitute $t = m + 20$: $m + (m + 20) + h = 140 \Rightarrow h = 120 - 2m$. Revenue: $8m + 15(m + 20) + 35(120 - 2m) = 2620 \Rightarrow -47m + 4500 = 2620 \Rightarrow m = 40$. Then $t = 60$ and $h = 40$. Solution: $(m, t, h) = (40, 60, 40)$.

10. A shipment of grain is made by mixing wheat, barley, and oats. Wheat costs \$320 per tonne, barley costs \$280 per tonne, and oats cost \$200 per tonne.

A total of 60 tonnes of grain is shipped with a total value of \$16,800. The mass of wheat is equal to the average of the masses of barley and oats.

How many tonnes of each grain are included in the shipment?

Let w, b, o represent tonnes of wheat, barley, and oats.

$$\begin{aligned}w + b + o &= 60 \\320w + 280b + 200o &= 16800 \\w &= \frac{b + o}{2}\end{aligned}$$

From $w = \frac{b+o}{2}$ and $w + b + o = 60$: $w + 2w = 60 \Rightarrow w = 20$, so $b + o = 40$. Then $320(20) + 280b + 200o = 16800 \Rightarrow 280b + 200o = 10400 \Rightarrow 7b + 5o = 260$. With $b + o = 40$, solve to get $b = 30$, $o = 10$. Solution: $(w, b, o) = (20, 30, 10)$.