Math 6 Unit 10 worksheet: One-step equations (answer key)

ANSWERS AT A GLANCE

1. (a) $x = 57$ (b) $m = 101$ (c) $y = 42$ (d) $k = 225$ (e) $w = 72$ (f) $c = 35$
2. (a) $p = 6.45$ (b) $t = 5.35$ (c) $z = 1\frac{5}{12}$ (d) $g = 5\frac{1}{10}$ (e) $r = 4.55$ (f) $h = 1\frac{7}{12}$
3. (a) $n = 23$ (b) $a = 136$ (c) $b = 2\frac{2}{3}$ (d) $d = 3.5$ (e) $x = 45$ (f) $y = 2\frac{2}{5}$ (g) $c = 13$ (h) $m = 3.75$
4. $h - 4.85 = 12.99$, so the hardcover costs 17.84 dollars.
5. 10 pages
6. (a) No: 3.6 − 2.4 = 1.2, not 6. (b) 2.4 was taken from x, so she should add 2.4 to both sides; $x = 8.4$.
7. (a) $p = 7.5$ (b) $p = 1\frac{3}{4}$ (c) $p = 7.25$

WORKED SOLUTIONS

1. Solve each equation. Check your answer in the original equation.

(a) $x + 45 = 102$ (b) $m - 37 = 64$ (c) $29 + y = 71$ (d) $150 = k - 75$ (e) $120 - w = 48$ (f) $93 = 58 + c$

ANSWER

(a) $x = 57$ (b) $m = 101$ (c) $y = 42$ (d) $k = 225$ (e) $w = 72$ (f) $c = 35$

SOLUTION

(a) 45 was added to x, so subtract 45 from both sides: $x = 102 - 45 = 57$. Check: 57 + 45 = 102.

(b) 37 was taken from m, so add 37 to both sides: $m = 64 + 37 = 101$. Check: 101 − 37 = 64.

(c) 29 was added to y (the order of adding does not matter), so subtract 29 from both sides: $y = 71 - 29 = 42$. Check: 29 + 42 = 71.

(d) The letter is on the right. 75 was taken from k, so add 75 to both sides: $150 + 75 = k$, so $k = 225$. Check: 225 − 75 = 150.

(e) Here w is the amount taken away. Add w to both sides: $120 = 48 + w$. Subtract 48 from both sides: $w = 120 - 48 = 72$. Check: 120 − 72 = 48.

(f) 58 was added to c, so subtract 58 from both sides: $93 - 58 = c$, so $c = 35$. Check: 58 + 35 = 93.

2. Solve each equation. Check your answer in the original equation.

(a) $p + 3.8 = 10.25$ (b) $t - 0.65 = 4.7$ (c) $\frac{5}{6} + z = 2\frac{1}{4}$ (d) $g - 3\frac{2}{5} = 1\frac{7}{10}$ (e) $12.4 - r = 7.85$ (f) $4\frac{1}{3} = h + 2\frac{3}{4}$

ANSWER

(a) $p = 6.45$ (b) $t = 5.35$ (c) $z = 1\frac{5}{12}$ (d) $g = 5\frac{1}{10}$ (e) $r = 4.55$ (f) $h = 1\frac{7}{12}$

SOLUTION

(a) Subtract 3.8 from both sides, writing it as 3.80 to line up the hundredths: $p = 10.25 - 3.80 = 6.45$. Check: 6.45 + 3.8 = 10.25.

(b) Add 0.65 to both sides: $t = 4.70 + 0.65 = 5.35$. Check: 5.35 − 0.65 = 4.7.

(c) Subtract $\frac{5}{6}$ from both sides. In twelfths, $2\frac{1}{4} = \frac{27}{12}$ and $\frac{5}{6} = \frac{10}{12}$, so $z = \frac{27}{12} - \frac{10}{12} = \frac{17}{12} = 1\frac{5}{12}$. Check: $\frac{10}{12} + \frac{17}{12} = \frac{27}{12} = 2\frac{1}{4}$.

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(d) Add $3\frac{2}{5}$ to both sides. In tenths, $3\frac{2}{5} = 3\frac{4}{10}$, so $g = 1\frac{7}{10} + 3\frac{4}{10} = 4\frac{11}{10} = 5\frac{1}{10}$. Check: $5\frac{1}{10} - 3\frac{4}{10} = 4\frac{11}{10} - 3\frac{4}{10} = 1\frac{7}{10}$.
(e) r is the amount taken away. Add r to both sides: $12.4 = 7.85 + r$. Subtract 7.85: $r = 12.40 - 7.85 = 4.55$. Check: 12.4 – 4.55 = 7.85.
(f) Subtract $2\frac{3}{4}$ from both sides. In twelfths, $4\frac{1}{3} = \frac{52}{12}$ and $2\frac{3}{4} = \frac{33}{12}$, so $h = \frac{52}{12} - \frac{33}{12} = \frac{19}{12} = 1\frac{7}{12}$. Check: $\frac{19}{12} + \frac{33}{12} = \frac{52}{12} = 4\frac{1}{3}$.

3. Solve each equation. Check your answer in the original equation.

(a) $6n = 138$ (b) $\frac{a}{8} = 17$ (c) $15b = 40$ (d) $14 = 4d$ (e) $\frac{3}{5}x = 27$
(f) $\frac{3}{8}y = \frac{9}{10}$ (g) $0.7c = 9.1$ (h) $3.2m = 12$

ANSWER
(a) $n = 23$ (b) $a = 136$ (c) $b = 2\frac{2}{3}$ (d) $d = 3.5$ (e) $x = 45$ (f) $y = 2\frac{2}{5}$ (g) $c = 13$ (h) $m = 3.75$

SOLUTION
(a) Divide both sides by 6: $n = 138 \div 6 = 23$. Check: 6 × 23 = 138.
(b) Multiply both sides by 8: $a = 17 \times 8 = 136$. Check: 136 ÷ 8 = 17.
(c) Divide both sides by 15: $b = \frac{40}{15} = \frac{8}{3} = 2\frac{2}{3}$. Check: $15 \times \frac{8}{3} = \frac{120}{3} = 40$.
(d) Divide both sides by 4: $d = \frac{14}{4} = 3.5$. Check: 4 × 3.5 = 14.
(e) Multiply both sides by the reciprocal $\frac{5}{3}$: $x = \frac{5}{3} \times 27 = \frac{135}{3} = 45$. Check: $\frac{3}{5} \times 45 = \frac{135}{5} = 27$.
(f) Multiply both sides by the reciprocal $\frac{8}{3}$: $y = \frac{9}{10} \times \frac{8}{3} = \frac{72}{30} = \frac{12}{5} = 2\frac{2}{5}$. Check: $\frac{3}{8} \times \frac{12}{5} = \frac{36}{40} = \frac{9}{10}$.
(g) Divide both sides by 0.7. Multiply both numbers by 10: 9.1 ÷ 0.7 = 91 ÷ 7 = 13. Check: 0.7 × 13 = 9.1.
(h) Divide both sides by 3.2. Multiply both numbers by 10: 12 ÷ 3.2 = 120 ÷ 32 = 3.75. Check: 3.2 × 3.75 = 9.6 + 2.4 = 12.

4. At a bookstore, the paperback of a novel costs 4.85 dollars less than the hardcover. The paperback costs 12.99 dollars. Let h be the price of the hardcover in dollars. Write an equation, solve it, and check your answer in the story.

ANSWER
$h - 4.85 = 12.99$, so the hardcover costs 17.84 dollars.

SOLUTION
"The paperback costs 4.85 dollars less than the hardcover" says the paperback price is $h - 4.85$, and the store gives it as 12.99:

$$h - 4.85 = 12.99$$

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The word "less" is in the story, but 4.85 was taken from h, so add 4.85 to both sides: $h = 12.99 + 4.85 = 17.84$.

Check in the story: 17.84 − 4.85 = 12.99 dollars, the paperback price, and the hardcover comes out more expensive, as the story says.

5. Sofia fills a photo album with prints from a class trip. Each page holds 5 photos, and every page used is full. Sofia put 50 photos in the album in all. Write an equation and solve it to find how many pages Sofia filled.

ANSWER

10 pages

SOLUTION

Let g be the number of pages filled. Each page holds 5 photos, so g pages hold $5g$ photos:

$$5g = 50$$

Divide both sides by 5: $g = 50 \div 5 = 10$.

Check in the story: 10 pages of 5 photos make 50 photos. A number of pages must be a whole number, and 10 is.

6. Amara solved $x - 2.4 = 6$ and wrote $x = 6 - 2.4 = 3.6$.

(a) Put her answer into the original equation. Does it work?

(b) Explain her mistake, then solve the equation correctly.

ANSWER

(a) No: 3.6 − 2.4 = 1.2, not 6. (b) 2.4 was taken from x, so she should add 2.4 to both sides; $x = 8.4$.

SOLUTION

(a) 3.6 − 2.4 = 1.2, and $1.2 \neq 6$, so $x = 3.6$ is not a solution.

(b) In $x - 2.4 = 6$, the number 2.4 was subtracted from x. The inverse of subtracting is adding, so add 2.4 to both sides (addition property). Amara subtracted 2.4 instead, which took it away a second time.

$$x - 2.4 + 2.4 = 6 + 2.4$$
$$x = 8.4$$

Check: 8.4 − 2.4 = 6. The answer is larger than 6, as it must be, since x is what there was before 2.4 was taken away.

7. In each equation the letter p stands for a number you must find. Find p so that the equation has the given solution.

(a) $px = 18$ has the solution $x = 2.4$.

(b) $x - p = 3\frac{1}{2}$ has the solution $x = 5\frac{1}{4}$.

(c) $p - x = 2.75$ has the solution $x = 4.5$.

ANSWER

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(a) $p = 7.5$ (b) $p = 1\frac{3}{4}$ (c) $p = 7.25$

SOLUTION

Put the given solution in for x. Then p is the only unknown, and each is a one-step equation.

(a) $2.4p = 18$. Divide both sides by 2.4: $p = 18 \div 2.4 = 180 \div 24 = 7.5$. Check: 7.5 × 2.4 = 18.

(b) $5\frac{1}{4} - p = 3\frac{1}{2}$. Here p is the amount taken away. Add p to both sides: $5\frac{1}{4} = 3\frac{1}{2} + p$. Subtract $3\frac{1}{2}$: $p = 5\frac{1}{4} - 3\frac{2}{4} = 4\frac{5}{4} - 3\frac{2}{4} = 1\frac{3}{4}$. Check: $5\frac{1}{4} - 1\frac{3}{4} = 3\frac{2}{4} = 3\frac{1}{2}$.

(c) $p - 4.5 = 2.75$. Now 4.5 was taken from p, so add 4.5 to both sides: $p = 2.75 + 4.50 = 7.25$. Check: 7.25 – 4.5 = 2.75.

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