

Fast Break Equations

The basketball season just tipped off. Use expressions and two-step equations to crack the box score. Scoring: two-point basket = 2, three-pointer = 3, free throw = 1. Every player and team on this sheet is made up.

Name _____

Date _____

MATH TOOLKIT

Variable

a letter that stands for an unknown number

Expression

numbers, letters and operations, no = sign

Evaluate

swap in the values, then compute

Equation

two sides that are equal

Inverse ops

undo + or - first, then $\times$ or $\div$



$$2x + 5 = 23$$



UNDO · SOLVE · CHECK

ROOKIE

- 1 A player's points are $2t + 3h + f$, where t = two-point baskets, h = three-pointers and f = free throws. Jada made **6 twos**, **3 threes** and **4 free throws**. Evaluate.

WORK SPACE

_____ points

ROOKIE

- 2 Marcus scored **8 points** in the first half. In the second half he made **h three-pointers** and nothing else. Write an expression for his total points.

WORK SPACE

_____ points

STARTER

- 3 Tia scored **23 points**. She made **5 free throws**, and the rest were two-point baskets. Solve $2x + 5 = 23$ to find how many twos she made.

WORK SPACE

$x =$ _____

STARTER

- 4 A fan buys a **\$45 jersey** and **t tickets** at **\$18 each**. She spends **\$117** in all. Write an equation and solve for t .

WORK SPACE

$t =$ _____ tickets

PRO

- 5 Nia played the **same number of minutes** in each of the 4 quarters, plus all **5 minutes** of overtime. She played **37 minutes** in all. How many minutes did she play each quarter?

WORK SPACE

_____ min

PRO

- 6 A bench player's plus-minus started at **+7**. It dropped by **3** during each of **n cold stretches** and ended at **-8**. Solve $7 - 3n = -8$.

WORK SPACE

$n =$ _____

ALL-STAR

- 7 Before the season's first game, Ava had **40 career points** and Kim had **64**. Ava scores **22 points** a game and Kim scores **18**. After how many games are they tied?

WORK SPACE

_____ games

CHALLENGE ★

- 8 Challenge: Each of the **5 starters** scored **x points** in the first half and **4 points** in the second half. The starters scored **70 points** in all. Solve $5(x + 4) = 70$.

WORK SPACE

$x =$ _____ points

A Box Score Expressions

Riverton Rockets starters, first game of the season. t = two-point baskets, h = three-pointers, f = free throws.

PLAYER	2-PT (t)	3-PT (h)	FT (f)	POINTS
Jada Cole	7	2	5	
Kim Park	3	5	3	
Omar Diaz	9	0	4	
Leo Grant	2	4	1	

Made-up Riverton Rockets box score.
Points = $2t + 3h + f$.

- Fill in **Points** for each player using $2t + 3h + f$.
- How many points did the four players score on **three-pointers** in all? _____ points
- A player made x two-point baskets, **twice as many** free throws as twos, and no threes. Write a **simplified** expression for her points. _____
- Evaluate your expression from question 3 when $x = 6$. _____ points

B Match the Equation

Write the equation from the bank that matches each play. One equation is not used.

Equation bank: $3x + 4 = 19$, $x/2 + 4 = 20$, $2x - 4 = 20$, $2x + 4 = 20$, $4x + 2 = 30$

- Ana made x two-point baskets and **4** free throws. She scored **20** points.
Equation _____
- Ben made x three-pointers and **4** free throws. He scored **19** points.
Equation _____
- Cam played x minutes in each of 4 quarters, plus **2** minutes of overtime. He played **30** minutes.
Equation _____
- Gia scored x points. Fay scored **4 fewer than twice** Gia's points. Fay scored **20**.
Equation _____

C Solve the Fast Break

Write a two-step equation for each play, then solve it. Check your answer in the story.

- A family buys **4** tickets at t dollars each and pays **\$10** for parking. They spend **\$86**. What is the price of one ticket?

WORK SPACE

\$ _____

- The **24-second** shot clock starts. The Rockets take **6** seconds to cross half court, then make p passes that take **2** seconds each. They shoot with **4** seconds left. How many passes?

WORK SPACE

_____ passes

- Jada averaged **21** points over her first **4** games. How many points does she need in game 5 to raise her average to **22**?

WORK SPACE

_____ points

- The Rockets trail **87-97**. They make h three-pointers while the Comets make one **two-point basket**. The game ends in a tie. How many three-pointers did they make?

WORK SPACE

$h =$ _____

BONUS · YOUR TURN

Write your own **two-step equation** about a basketball game. Use a made-up player. Then solve it and check it.

- _____
- _____
- _____

✓ **Answer Key** (for teachers & parents)

Answers for **Fast Break Equations**, with the work shown. Print pages 1 and 2 for students and keep this page for checking. Accept equivalent expressions and equations (for example, $3h + 8$ or $45 + 18t = 117$).

Page 1 Problems

1. Answer: 25 points

$$2(6) + 3(3) + 4 = 12 + 9 + 4.$$

2. Answer: 8 + 3h

Each three-pointer adds 3 points to his 8.

3. Answer: $x = 9$

$$2x = 23 - 5 = 18, \text{ so } x = 18 \div 2.$$

4. Answer: $t = 4$ tickets

$$18t + 45 = 117, \text{ so } 18t = 72, \text{ so } t = 72 \div 18.$$

5. Answer: 8 min

$$4m + 5 = 37, \text{ so } 4m = 32, \text{ so } m = 8.$$

6. Answer: $n = 5$

$$-3n = -8 - 7 = -15, \text{ so } n = -15 \div -3.$$

7. Answer: 6 games

$$40 + 22g = 64 + 18g, \text{ so } 4g = 24. \text{ Both have } 172.$$

8. Answer: $x = 10$ points

$$5(x + 4) = 70, \text{ so } x + 4 = 14, \text{ so } x = 10.$$

Quick score

Page 1 problems _____ / 8

A · Box Score _____ / 4

B · Match the Equation _____ / 4

C · Solve the Fast Break _____ / 4

Total _____ / 20

Skills practiced

Writing expressions

Evaluating expressions

Combining like terms

Two-step equations

Integers

Variables on both sides

Mean

Teaching tip: Have students **check** every answer by putting it back into the story, not just the equation. In page 1 #6, watch the signs: dividing -15 by -3 gives a positive 5. In C3, many students add 1 to the average and answer 22. The fifth game must lift **all five** games, so it takes 26. **Bonus:** any equation is fine if it matches the student's story and is solved correctly.

A · Box Score Expressions

1. Answer: Jada 25 · Kim 24 · Omar 22 · Leo 17

$$\text{Jada } 14 + 6 + 5, \text{ Kim } 6 + 15 + 3, \text{ Omar } 18 + 0 + 4, \text{ Leo } 4 + 12 + 1.$$

2. Answer: 33 points

$$11 \text{ three-pointers} \times 3.$$

3. Answer: 4x

$$\text{Twos: } 2x. \text{ Free throws: } 2x \times 1 = 2x. 2x + 2x = 4x.$$

4. Answer: 24 points

$$4(6) = 24.$$

B · Match the Equation

1. Answer: $2x + 4 = 20$

$$x = 8$$

2. Answer: $3x + 4 = 19$

$$x = 5$$

3. Answer: $4x + 2 = 30$

$$x = 7$$

4. Answer: $2x - 4 = 20$

$$x = 12$$

Not used: $x/2 + 4 = 20$

C · Solve the Fast Break

1. Answer: \$19

$$4t + 10 = 86, \text{ so } 4t = 76, \text{ so } t = 19.$$

2. Answer: 7 passes

$$24 - 6 - 2p = 4, \text{ so } 18 - 2p = 4, \text{ so } p = 7.$$

3. Answer: 26 points

$$(84 + x) \div 5 = 22, \text{ so } 84 + x = 110.$$

4. Answer: 4 three-pointers

$$87 + 3h = 97 + 2 = 99, \text{ so } 3h = 12.$$

Check it: plug answers back in

- Page 1 #3: $2(9) + 5 = 23$ ✓
- Page 1 #6: $7 - 3(5) = -8$ ✓
- Page 1 #7: $40 + 22(6) = 64 + 18(6) = 172$ ✓
- C2: $6 + 2(7) + 4 = 24$ seconds ✓
- C3: $(84 + 26) \div 5 = 22$ ✓
- C4: $87 + 3(4) = 99 = 97 + 2$ ✓