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Math 506

India — Dust and Wild Elephants

The cool breeze coming through the open window feels good, even though the dust that blows into the Jeep makes me cough. Most of the cars here in India don't have air conditioning, so we keep the Jeep windows rolled down when we drive along the dusty roads.

I'm Jordan Reston. I live with my Dad, Mom, brothers, and sisters in Ambikapur, India. My parents came from Canada, but I was born here, so I'm used to the dust, heat, mud huts, and the wild elephants that occasionally wander up and down the village street.

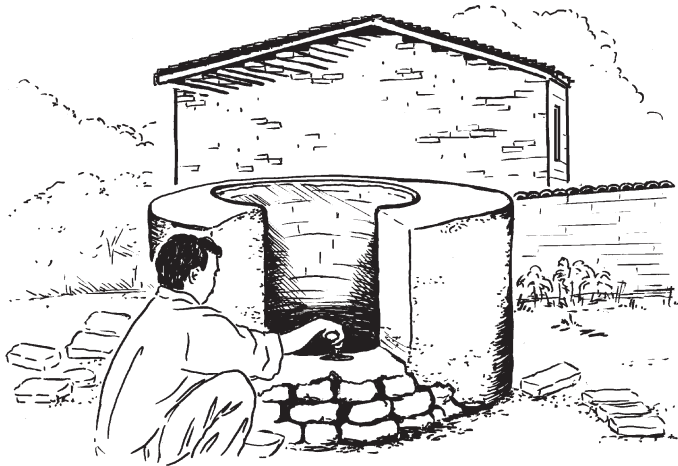
Early every Sunday morning my entire family crams into our Jeep and sets off for church. With the help of another minister, Pastor Pradeep, my father has been preaching in several villages in the vicinity of Ambikapur. Our Sunday drives take us to a

number of these villages. My dad holds services for people who may ride their bicycles for several hours to get to church. Obviously, these people have a hunger for the truth of the Gospel.

Besides preaching, some of the missionaries here minister to the physical needs of the Indian people. They bring medicines to the sick and help build walls around wells so people can draw water safely without falling in. Pure water is scarce in India, so wells are very important for good health in this hot climate.

Whenever I get a break, I enjoy playing *muchli bati* (marbles) with Pastor Pradeep's son Deepak. One of Deepak's favorite activities is singing hymns in the local language, Hindi.

Join us on our ride and see what you can learn about India and its many people.



1

Introduce the LightUnit

Hand out LightUnit 506.

Read the introductory story about India from page 1 together as a class. This story is based on an actual mission in India and the missionaries who have served there.

Lesson 1 pp. 2-5

Lesson Preparation


- LightUnit 506 for each student
- Prepare to teach Lesson 1 to your class by reading over the lesson and making sure you understand the algebraic form of solving simple equations.

Drill

- Do Speed Drill 1 and write the number correct on the blank.

Teacher Check.

Students may need help understanding this lesson.



1

Speed Drill 1

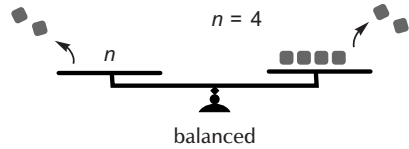
Solving Equations

○ A variable is a letter that represents an unknown number. A variable can stand for different numbers in different equations. $n + 2 = 6$ is an equation with a variable. It means an unknown number is added to 2. Finding what the variable stands for is finding the number that will balance the equation.

To get n by itself, remove 2 from each side of the equation.

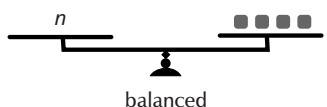
$2 - 2 = 0$

$6 - 2 = 4$

$$\begin{array}{r} n + 2 = 6 \\ -2 \quad -2 \\ \hline n + 0 = 4 \\ n = 4 \end{array}$$


balanced

$n = 4$



balanced

To find n , we must remove everything else from that side of the equation so that n is by itself.

If we remove the same number of weights from each side, the equation will balance. By removing 2 from each side, we can see that $n = 4$.

Remember:
To keep the equation balanced, do the same thing to both sides of the equation.

" n " balances with 4 weights so we know that " n " weighs the same as 4 weights.

Pastor Pradeep had some tracts to deliver. He's already given away 9, and he still has 16 tracts left to give away. How many tracts did he start with?

$$\begin{array}{r} n - 9 = 16 \\ +9 \quad +9 \\ \hline n + 0 = 25 \\ n = 25 \end{array}$$

Pastor Pradeep had 25 tracts to start with.

n = 25
solution

To get n alone we must remove -9 .

$+9$ is the opposite of -9 , so add 9 to both sides of the equal sign. Opposites equal 0.

$+0$ doesn't change anything, so we just cross it out.

2

Teaching the Lesson

Solving Equations

In this lesson the students will meet the variable and learn what it is. They will learn how to solve a simple addition or subtraction sentence that includes a variable. Although they can probably figure out the solution to many of the equations by simple inspection and logical thinking, it is important that they learn the algebraic concept of balancing equations by performing opposite functions to both sides of the equal sign.

Teacher Check on page 2.

Lesson 1

Here is one more example. This example will show you how to solve the equation without writing +0 and crossing it out.

$$\begin{array}{r} n + 4 = 10 \\ -4 \quad -4 \\ \hline n = 6 \end{array}$$

solution

We must remove 4.
-4 is the opposite of +4 so we subtract 4 from both sides.
Solve $4 - 4$ and $10 - 4$ mentally and write $n = 6$.

Indians often enjoy a drink made of sugarcane juice and fresh lime juice.

Solve these equations. The first two show you how.

- | | | | |
|--|--|---|--|
| 1. a. $n + 12 = 24$
$\begin{array}{r} -12 \quad -12 \\ \hline n = 12 \end{array}$ | b. $n - 6 = 38$
$\begin{array}{r} +6 \quad +6 \\ \hline n = 44 \end{array}$ | c. $n + 9 = 14$
$\begin{array}{r} -9 \quad -9 \\ \hline n = 5 \end{array}$ | d. $n - 9 = 16$
$\begin{array}{r} +9 \quad +9 \\ \hline n = 25 \end{array}$ |
| 2. a. $n - 12 = 18$
$\begin{array}{r} +12 \quad +12 \\ \hline n = 30 \end{array}$ | b. $n + 5 = 20$
$\begin{array}{r} -5 \quad -5 \\ \hline n = 15 \end{array}$ | c. $n + 10 = 23$
$\begin{array}{r} -10 \quad -10 \\ \hline n = 13 \end{array}$ | d. $n - 7 = 8$
$\begin{array}{r} +7 \quad +7 \\ \hline n = 15 \end{array}$ |

We Remember

Write vertical or horizontal to complete the sentences.

3. An H uses one horizontal line and two vertical lines.
4. An E uses one vertical line and three horizontal lines.

Write the number.

5. Six hundred ninety-three million, two hundred sixty-seven thousand, four hundred twenty-eight 693,267,428

Change to improper fractions.

6. a. $2\frac{2}{9} = \frac{20}{9}$ b. $6\frac{3}{4} = \frac{27}{4}$ c. $2 = \frac{2}{1}$ d. $8 = \frac{8}{1}$

3

Tips for Struggling Students

→ Students may not understand that the numbers and expressions on either side of the equal sign must always balance. Show them the following:

$$\begin{array}{l} 2 + 3 = 5 \\ 5 = 5 \\ 13 - 6 = 7 \\ 7 = 7 \\ 7 + 2 = 9 \\ 9 = 9 \end{array}$$

Now replace one number on the left side of each equation with a variable:

$$\begin{array}{l} n + 3 = 5 \\ n - 6 = 7 \\ n + 2 = 9 \end{array}$$

If we don't know what number added to 3 makes 5, we can start at the end of the equation and work backward, doing the opposite operation: $5 - 3 = ?$ (2) By doing the opposite of +3, we got rid of 3 and made the unknown number (2) stand alone by itself.

If we don't know what

number minus 6 makes 7, we start at the end of the equation and work backward, doing the opposite operation: $7 + 6 = ?$ (13) By doing the opposite of -(6), we got rid of 6 and made the unknown number (13) stand alone by itself.

Continue the same explanation for $n + 2 = 9$. Then show students that the goal in solving equations with variables is to get the variable all by itself. We do this by performing the opposite operation to the one shown. Then, to keep the sides balanced, we must remember to do the same thing to both sides of the equal sign.

Board Work

Solve these equations.

$\begin{array}{r} n + 5 = 10 \\ -5 \quad -5 \\ \hline n = 5 \end{array}$	$\begin{array}{r} n - 7 = 9 \\ +7 \quad +7 \\ \hline n = 16 \end{array}$	$\begin{array}{r} n - 8 = 3 \\ +8 \quad +8 \\ \hline n = 11 \end{array}$	$\begin{array}{r} n + 4 = 5 \\ -4 \quad -4 \\ \hline n = 1 \end{array}$
--	--	--	---

Lesson 1

7. Jordan and Deepak were playing *muchi bati* (marbles). Each boy began with 33 marbles. By the end of the game, Jordan had $\frac{1}{3}$ of Deepak's marbles. How many marbles does Jordan have now?

$$\begin{array}{r} 11 \\ 3 \overline{)33} \\ \underline{3} \\ 3 \\ \underline{3} \\ 0 \end{array} \qquad \begin{array}{r} 33 \\ + 11 \\ \hline 44 \end{array}$$

Answer: 44 marbles

8. How many marbles does Deepak have?

$$\begin{array}{r} 33 \\ - 11 \\ \hline 22 \end{array}$$



Answer: 22 marbles

Write these fractions and mixed numbers as decimals.

9. a. $3\frac{1}{2}$ 3.5 b. $\frac{5}{10}$ 0.5 c. $\frac{50}{100}$ 0.50 d. $6\frac{50}{100}$ 6.50

Write < , > , or = to make true statements.

10. a. 4.2 = 4.20 b. 5.690 > 5.096 c. 7.023 < 7.203 d. 0.5 = 0.500

Write these as one-place decimals.

11. a. 4.20 4.2 b. 5.900 5.9 c. 7.200 7.2

Put a check mark (✓) in the blank after each number that is divisible . . .

12. by 9. a. 90 b. 711 c. 108 d. 99 e. 96
 13. by 6. a. 94 b. 108 c. 114 d. 99 e. 96

Write < or > .

14. a. 10 -10 b. -6 -9 c. -23 8 d. -5 4

Expand the number by multiplying each digit by its place value.

15. $704,060,842,000 = \underline{(7 \times 100,000,000,000) + (4 \times 1,000,000,000) + (6 \times 10,000,000) + (8 \times 100,000) + (4 \times 10,000) + (2 \times 1,000)}$

Teacher Notes:

Lesson 1

— $\frac{+}{-} \times$ Skill Builders —

16. a. $24 \overline{) 2R5}$
 $\underline{48}$
 5

b. $14 \overline{) \$0.55}$
 $\underline{70}$
 70
 $\underline{70}$
 0

c. $\begin{array}{r} 2 \\ 8 \\ \times 36 \\ \hline 3552 \\ \hline 17760 \\ \hline 213.12 \end{array}$

17. a. $6 \overline{) 1\frac{2}{3}} = 2\frac{1}{3}$
 $2\frac{3}{6} = 2\frac{1}{2}$

b. $2\frac{5}{8}$
 $+ 4\frac{7}{8}$
 $6\frac{12}{8} = 7\frac{4}{8} = 7\frac{1}{2}$

c. $\begin{array}{r} 16.321 \\ + 28.000 \\ \hline 34.321 \end{array}$

Simplify these expressions.

18. a. $(15 - 5) \div 5 \times 2$
 $10 \div 5 \times 2$
 2×2
 4

b. $6 + 12 \div 6 + (8 - 3)$
 $6 + 2 + 5$
 $8 + 5$
 13

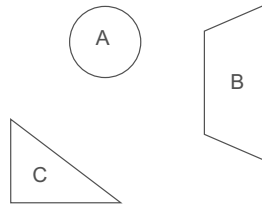
c. $24 - 12 \div 4 + 2 \times 10$
 $24 - 3 + 20$
 $21 + 20$
 41

Follow the directions.

19. Write the letter of the quadrilateral. B

20. Underline true statements about all quadrilaterals.

- a. They have four angles.
- b. They have three sides.
- c. They have four sides.



Solve these equations.

21. a. $n + 9 = 18$
 $\underline{-9 \quad -9}$
 $n = 9$

b. $n + 5 = 16$
 $\underline{-5 \quad -5}$
 $n = 11$

c. $n - 8 = 4$
 $\underline{+8 \quad +8}$
 $n = 12$

d. $n + 9 = 11$
 $\underline{-9 \quad -9}$
 $n = 2$


Teacher Notes:

Lesson 2 pp. 6-9

Lesson Preparation

Drill

- Do Speed Drill 2 and write the number correct on the blank.



Speed Drill 2

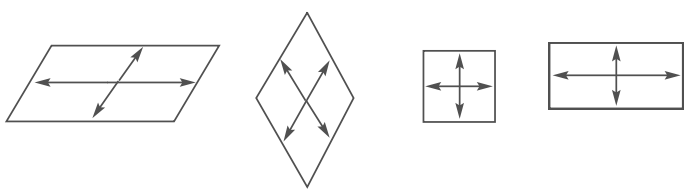
Understanding Parallelograms

Quadrilaterals are polygons with four sides and four angles. There are different kinds of quadrilaterals. **Parallelograms** are quadrilaterals whose opposite sides are parallel.

Quadrilaterals

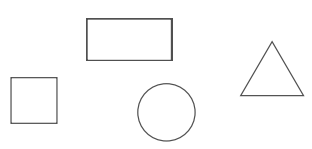
square	rectangle	rhombus
trapezoid	parallelogram	


Notice how the arrows point to the parallel sides opposite each other on the parallelograms below.



Write true or false.

1. A circle is a parallelogram. false
2. A parallelogram is a quadrilateral whose opposite sides are parallel. true
3. A rectangle is a parallelogram. true
4. A square is a parallelogram. true
5. A triangle is a parallelogram. false





We Remember

Solve these equations.

<p>6. a. $n + 5 = 7$</p> $\begin{array}{r} n + 5 = 7 \\ -5 \quad -5 \\ \hline n = 2 \end{array}$	<p>b. $n - 5 = 12$</p> $\begin{array}{r} n - 5 = 12 \\ +5 \quad +5 \\ \hline n = 17 \end{array}$	<p>c. $n - 14 = 2$</p> $\begin{array}{r} n - 14 = 2 \\ +14 \quad +14 \\ \hline n = 16 \end{array}$	<p>d. $n + 8 = 11$</p> $\begin{array}{r} n + 8 = 11 \\ -8 \quad -8 \\ \hline n = 3 \end{array}$
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6

Teaching the Lesson

Understanding Parallelograms

There are two requirements for a parallelogram: It must be a quadrilateral, and it must have two pairs of parallel sides. Because they meet these two requirements, all squares and rectangles can be classified as parallelograms. However, not all parallelograms are squares or rectangles, because the angles of a parallelogram do not have to be right angles.

Lesson 2

7. Jordan's church helps build brick walls around village wells so that little children can't fall in. The bricks for the well at Muktipada cost 1,970 rupees (Indian money), and the bricks for the well at Shri Ram cost 1,875 rupees. How much did it cost to buy bricks for both wells?

$$\begin{array}{r} 11 \\ 1970 \\ + 1875 \\ \hline 3845 \end{array}$$

Answer: 3,845 rupees

8. How much more expensive was the wall at Muktipada than the wall at Shri Ram?

$$\begin{array}{r} 864 \\ 1970 \\ - 1875 \\ \hline 95 \end{array}$$

Answer: 95 rupees

— ? . . . Mental Math —

9. a. $390 + 30 = \underline{420}$ b. $22,000 - 6,000 = \underline{16,000}$ c. $100 - 92 = \underline{8}$

10. a. $300 \times 500 = \underline{150,000}$ b. $0.005 \times 1,000 = \underline{5}$ c. $50 \div 100 = \underline{0.5}$

11. $\frac{8}{2} + 26 \times 80 + 100 + 6 + 100 = \underline{0.3}$

Write the ratio in three different ways.

A snail crawls 3 cm in 2 minutes.

12. What is the ratio of minutes to cm?
2:3 2 to 3 $\frac{2}{3}$

The people of India speak 16 main languages and over 1,000 other languages and dialects.

Order these decimal numbers from least to greatest.

13. 0.26 0.2 0.292 0.29 0.2 0.26 0.29 0.292

14. 1.885 1.682 1.867 1.682 1.867 1.885

Tips for Struggling Students

➔ Review the requirements of a polygon (a closed figure that has straight sides) and a quadrilateral (a polygon that has four sides). A parallelogram has the characteristics of a polygon and a quadrilateral, with one more characteristic—it has two pairs of parallel sides. Show students where to find the classifications of quadrilaterals on their *Intermediate Math Reference Charts*.

Oral Work (Continued on page 10.)

Can a triangle be a parallelogram? (No) Why not? (A triangle is not a quadrilateral. or A triangle does not have four sides.)

Is a square always a parallelogram? (Yes) Why? (A square is a quadrilateral whose opposite sides are parallel.)

Is a rectangle always a parallelogram? (Yes) Why? (A rectangle is a quadrilateral whose opposite sides are parallel.)

Is a quadrilateral always a parallelogram? (No) Why not? (Not all quadrilaterals have two pairs of parallel sides.)

Is a parallelogram always a square? (No) Why not? (Not all parallelograms have square corners, and not all parallelograms have four sides of equal length.)

Lesson 2

+ **-** **x** *Skill Builders*

15. a. $62 \overline{) 4,956}$

$$\begin{array}{r} 79\text{R}58 \\ 62 \overline{) 4956} \\ \underline{434} \\ 616 \\ \underline{558} \\ 58 \end{array}$$

b. $63 \overline{) 762}$

$$\begin{array}{r} 12\text{R}6 \\ 63 \overline{) 762} \\ \underline{63} \\ 132 \\ \underline{126} \\ 6 \end{array}$$

c. $\begin{array}{r} 2 \\ 2 \\ \cancel{3} \\ 217 \\ \times 435 \\ \hline 1085 \\ 6510 \\ \hline 86800 \\ \hline 94,395 \end{array}$

d. $\begin{array}{r} 7 \\ \cancel{0} \\ 0.710 \\ - 0.23 \\ \hline 0.57 \end{array}$

16. a. $13 \frac{1}{7} = \frac{24}{7}$

$$13 \frac{1}{7} = \frac{24}{7}$$

16. a. $-6 \frac{1}{3} = -\frac{7}{21}$

$$-6 \frac{1}{3} = -\frac{7}{21}$$

b. $4 \frac{6}{6}$

$$4 \frac{6}{6}$$

b. $-3 \frac{5}{6}$

$$-3 \frac{5}{6}$$

c. $\begin{array}{r} 0.2 \\ \times 0.05 \\ \hline 0.010 \end{array}$

d. $3 \frac{3}{4} = \frac{9}{12}$

$$3 \frac{3}{4} = \frac{9}{12}$$

d. $+ 5 \frac{2}{3} = \frac{8}{12}$

$$+ 5 \frac{2}{3} = \frac{8}{12}$$

$8 \frac{17}{12} = 9 \frac{5}{12}$

17. a. $\frac{1}{8} \times \frac{1}{3} = \frac{1}{3}$

$$\frac{1}{8} \times \frac{1}{3} = \frac{1}{3}$$

b. $\frac{2}{3} \times \frac{3}{11} = \frac{6}{11}$

$$\frac{2}{3} \times \frac{3}{11} = \frac{6}{11}$$

c. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

d. $\frac{3}{8} \times \frac{3}{8} = \frac{9}{64}$

$$\frac{3}{8} \times \frac{3}{8} = \frac{9}{64}$$

Circle the most sensible measurement of capacity.

18. Water for a bath

40 mL

40 L

19. Ice cream in a double dip cone

1 cup

1 gallon

20. Baking powder for a cake

3 teaspoons

3 cups

Change to improper fractions.

21. a. $3 \frac{1}{12} = \frac{37}{12}$

b. $1 \frac{9}{16} = \frac{25}{16}$

c. $16 = \frac{16}{1}$

Find the average.

22. The chart shows how much Mrs. Reston spent for fresh produce each week for a month. Find the average cost per week.

44 rupees

Cost of fresh produce

Week 1	48 rupees
Week 2	36 rupees
Week 3	52 rupees
Week 4	40 rupees



$$\begin{array}{r} 1 \\ 48 \\ 36 \\ 52 \\ + 40 \\ \hline 176 \end{array}$$

$$\begin{array}{r} 44 \\ 4 \overline{) 176} \\ \underline{16} \\ 16 \\ \underline{16} \\ 0 \end{array}$$

8

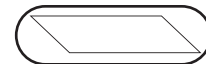
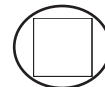
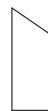
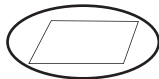
Oral Work, continued

Is a parallelogram always a quadrilateral? (*Yes*) Why? (*A parallelogram must have four sides.*)

Can a parallelogram be a rectangle? (*Yes*) Why? (*A parallelogram has four sides and two pairs of parallel sides, and so does a rectangle.*)

Board Work

Circle all the parallelograms.



Lesson 2

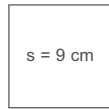
Write the formulas and find the answers.

23. a. area of a square

$$A = s^2$$

$$A = 9 \times 9$$

$$A = 81 \text{ cm}^2$$

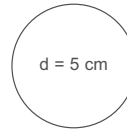


b. circumference of a circle

$$C = \pi \times d$$

$$C = 3.14 \times 5$$

$$C = 15.7 \text{ m}$$



$$\begin{array}{r} 3.14 \\ \times 5 \\ \hline 15.7 \end{array}$$

Find the perimeter of the square above.

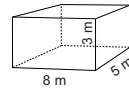
24. a. 36 cm

Find the volume of the solid below.

b. $8 \times 5 \times 3 = 120 \text{ m}^3$

$$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 40 \\ \times 3 \\ \hline 120 \end{array}$$



Solve each side of the equation. Write = or \neq to show whether the equations balance.

25. a. $13 + 6$ 11×5
19 55

b. $12 - 6$ $30 \div 5$
6 6

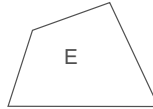
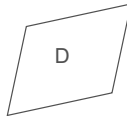
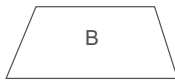
c. 11×3 3×11
33 33

Write *horizontal* or *vertical* to complete the sentences. Use the figures below.

26. Figure C has 2 horizontal and 2 vertical lines.

27. Figure B has 2 horizontal lines.

Write *yes* if the quadrilateral is a parallelogram and *no* if it is not a parallelogram.



28. a. yes b. no c. yes d. yes e. no

Teacher Notes:
