

Problem Solving: Looking
Beyond the Obvious
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Desired Outcomes

- Review, classify, and create different types of word problems.
- Use cues to determine the type of operation to be performed in order to avoid key words.

OMG Word Problems.....

- What do you think of when you hear word problems?
- Write a word problem.
- Set to the side for now.
- Key Words

Key Words

Now What?

The animal park has 12 zebras, 25 monkeys and some giraffes. If the total number of zebras, monkeys, and giraffes at the park is 50, how many giraffes are there?

Close Your Eyes

- Trey has 3 toy planes. Kyle has 6 more planes than Trey. How many planes does Kyle have?

- $3 + 6 = \underline{9}$
- Kyle has 9 toy planes.

Close Your Eyes

- Kim drew 5 circles. Sam drew 3 circles. How many more circles did Kim draw than Sam?



- $5 - 3 = \underline{2}$
- Kim drew 2 more circles than Sam.

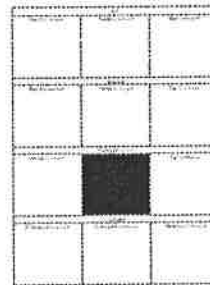
Mental Images

"Comprehension of textual information increases when students can create detailed mental pictures of what they are reading."
(Muehlher, Sieman)

Word Problem Sorting Activity

- Please find a partner.
- Using the sorting mat, sort the word problems provided.
- Thumbs up when you are ready to discuss.

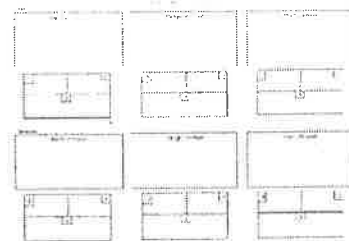
Sorting Mat



What comes to mind?



My Examples of Word Problems



Join

- There is a change over time.
- There is a direct or implied action.
- The initial quantity is increased by a particular amount.
- There are **3** distinct types.

Join

Result Unknown

Frank has 4 books to read. He gets 3 more books from the library. How many books does he have now?

$$4 + 3 = ?$$

Create



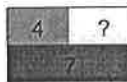
Join

Change Unknown

Frank has 4 books to read. How many more books will he need to have read 7 altogether?

$$4 + ? = 7$$

Create



Join

Start Unknown

Frank has some books. He gets 3 from the library. Now he has 7 books to read. How many books did Frank have to start with?

$$? + 3 = 7$$

Create



Separate

- There is a change over time.
- There is a direct or implied action.
- The initial quantity is decreased by a particular amount.
- There are **3** distinct types.

Separate

Result Unknown

Jessica had 14 toy cars. She lost 11 of the cars. How many cars does she have left?

$$14 - 11 = ?$$

Create



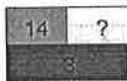
Separate

Change Unknown

Jessica had 14 toy cars. She gave some to Tim. Now she has 3 toy cars. How many toy cars did she give to Tim?

$$14 - ? = 3$$

Create



Separate

Start Unknown

Jessica had some toy cars. She gave 11 to Tim. Now she has 3 toy cars. How many toy cars did she have to start with?

$$? - 3 = 11$$

Create



Part-part whole

- There is **no** change over time.
- There is **not** a direct or implied action.
- There are **2** types.

Part-part whole

Whole Unknown

Tommy has 8 green buttons and 3 purple buttons. How many buttons does he have?

$$\underset{\text{(green)}}{8} + \underset{\text{(purple)}}{3} = ?$$

Create



Part-part whole

Part Unknown

Tommy has 11 buttons. 8 are green and the rest are purple. How many purple buttons does Tommy have?

$$11 - \underset{\text{(green)}}{8} = \underset{\text{(purple)}}{?}$$

Create



Compare

- There is a relationship between quantities.
- There is a comparison of two distinct, disjointed sets.
- There are **3** types- referent, compared, difference.

Compare

- **Difference Unknown**

Tommy has 11 buttons. Tess has 5 buttons. How many more buttons does Tommy have than Tess?

$$11 - 5 = ?$$



Create

Compare

- **Compared Unknown**

Tess has 5 buttons. Tommy has 6 more than Tess. How many buttons does Tommy have?

$$5 + 6 = ?$$

Create



Compare

- **Referent Unknown**

Tommy has 11 buttons. He has 6 more buttons than Tess. How many buttons does Tess have?

$$11 - 6 = ?$$



Create

Processing

- Which of the word problems did you find it less difficult to write?
- Which of the word problems did you find it most difficult to write?

How did you do on your sort?

Tommy has 11 buttons. Tess has 5 buttons. How many more buttons does Tommy have than Tess?	Tess has 5 buttons. Tommy has 6 more than Tess. How many buttons does Tommy have?	Tommy has 11 buttons. He has 6 more buttons than Tess. How many buttons does Tess have?

Join

Tommy has 11 buttons. Tess has 5 buttons. How many more buttons does Tommy have than Tess?	Tess has 5 buttons. Tommy has 6 more than Tess. How many buttons does Tommy have?	Tommy has 11 buttons. He has 6 more buttons than Tess. How many buttons does Tess have?

Separate

Word Problem	Equation	Math Problem
Jordan had 24 toy cars. She lost 11 of them. How many cars does she have left?	Jordan had 24 toy cars. She gave some to Tim. Now she has 8 toy cars. How many toy cars did she give to Tim?	Jordan had more toy cars than Tim. Tim has 15 toy cars. How many toy cars does Jordan have?

Part-part whole

Word Problem	Diagram	Equation
Terry has 8 buttons and 3 buttons. How many buttons does he have?		Terry has 22 buttons. Eight are green and the rest are blue. How many blue buttons does Terry have?

Compare

Word Problem	Equation	Math Problem
Terry has 12 buttons. Tim has 5 buttons. How many more buttons does Terry have than Tim?	Terry has 8 buttons. Tim has 3 more buttons than Terry. How many buttons does Tim have?	Terry has 22 buttons. Tim has more buttons than Terry. How many buttons does Tim have?

Sorting Activity Part 2

Word Problem	Equation	Math Problem

Word Problem

Equation

Math Problem

Grouping/Partitioning

- There are three quantities.
- Three types of problems-multiplication, measurement division, partitive division.

Grouping/Partitioning

- **Multiplication problems have an unknown total.**

Todd has 6 bags of cookies. There are 4 cookies in each bag. How many cookies does Todd have?

$$6 \times 4 = ?$$

6	4

Create

Grouping/Partitioning

- **Measurement division problems has an unknown number of groups.**

Todd has 24 cookies. He puts 4 cookies in each bag. How many bags can he fill?

$$24 \div ? = 4$$



Create

Grouping/Partitioning

- **Partitive division has an unknown amount in each group.**

Todd has 24 cookies. He puts the cookies into 6 bags with the same number of cookies in each bag. How many cookies are in each bag?

$$24 \div 6 = ?$$

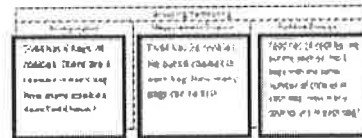


Create

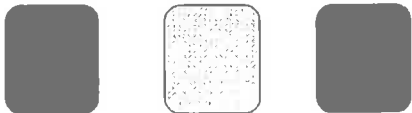
Processing

- Which of the word problems did you find it less difficult to write?
- Which of the word problems did you find it most difficult to write?

How did you do on your sort?



Memory Beads



Green Yellow Red

- Kim has 5 cats and 3 dogs. How many pets does she have?
- There were 8 people from Chicago and some people from New York on the bus. There were 12 people in all. How many people were from New York?

Green Yellow Red

- Rhonda set up a lemonade stand. By the end of the day she sold 7 glasses and had 9 glasses left. How many glasses did she have to begin with?
- 10 students ride the bus. 7 were girls and the rest were boys. How many boys ride the bus?

Green Yellow Red

- Jordan has 14 candles on his birthday cake. His brother has 7 candles on his cake. How many more candles does Jordan have?
- Les made 24 batches of cookies. There are 9 cookies in each batch. How many cookies did he make?

Green Yellow Red

- George tied 30 sticks into 3 equal bundles. How many sticks were there in each bundle?
- Jim had 56 balls packed into boxes of 8. How many boxes are there?

Back to the Beginning

- Review your word problem.
- Determine the word problem type.
- Label your word problem.
- Post your word problem.
- What do you notice about the problems posted?

Questions???

Q&A

References

Children's Mathematics: Cognitively Guided Instruction Carpenter, Fennema, Franke, Levi, Empson

www.tagxedo.com

Thank You!

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Word Problem Sorting Activity

Join		
Result Unknown	Change Unknown	Start Unknown
Separate		
Result Unknown	Change Unknown	Start Unknown
Part-part-whole		
Whole unknown		Part Unknown
Compare		
Difference Unknown	Compared Unknown	Referent Unknown

Word Problem Sorting Activity

Frank has 4 books to read. He gets 3 more books from the library. How many books does he have now?

Frank has some books. He gets 3 from the library. Now he has 7 books to read. How many books did Frank have to start with?

Frank has 4 books to read. How many more books will he need to have read 7 altogether?

Jessica had 14 toy cars. She lost 11 of the cars. How many cars does she have left?

Jessica had 14 toy cars. She gave some to Tim. Now she has 3 toy cars. How many toy cars did she give to Tim?

Jessica had some toy cars. She gave 11 to Tim. Now she has 3 toy cars. How many toy cars did she have to start with?

Tommy has 8 green buttons and 3 purple buttons. How many buttons does he have?

Tommy has 11 buttons. Eight are green and the rest are purple. How many purple buttons does Tommy have?

Tommy has 11 buttons. Tess has 5 buttons. How many more buttons does Tommy have than Tess?

Tess has 5 buttons. Tommy has 6 more than Tess. How many buttons does Tommy have?

Tommy has 11 buttons. He has 6 more buttons than Tess. How many buttons does Tess have?

Word Problem Sorting Activity

Grouping/Partitioning		
Multiplication	Measurement Division	Partitive Division

Grouping/Partitioning		
Multiplication	Measurement Division	Partitive Division

Grouping/Partitioning		
Multiplication	Measurement Division	Partitive Division

Word Problem Sorting Activity

Todd has 6 bags of cookies. There are 4 cookies in each bag. How many cookies does Todd have?

Todd has 24 cookies. He puts 4 cookies in each bag. How many bags can he fill?

Todd has 24 cookies. He put the cookies into 6 bags with the same number of cookies in each bag. How many cookies are in each bag?

Todd has 6 bags of cookies. There are 4 cookies in each bag. How many cookies does Todd have?

Todd has 24 cookies. He puts 4 cookies in each bag. How many bags can he fill?

Todd has 24 cookies. He put the cookies into 6 bags with the same number of cookies in each bag. How many cookies are in each bag?

Todd has 6 bags of cookies. There are 4 cookies in each bag. How many cookies does Todd have?

Todd has 24 cookies. He puts 4 cookies in each bag. How many bags can he fill?

Todd has 24 cookies. He put the cookies into 6 bags with the same number of cookies in each bag. How many cookies are in each bag?

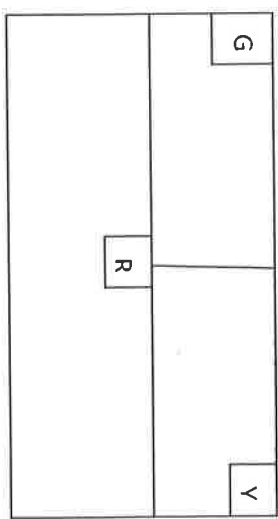
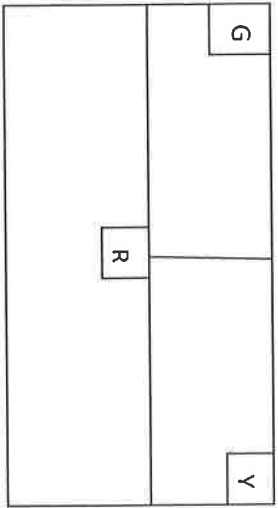
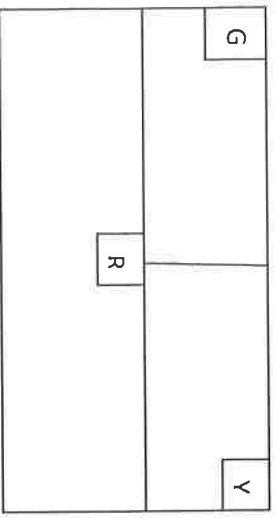
Join

My Examples of Word Problems

Result Unknown

Change Unknown

Start Unknown

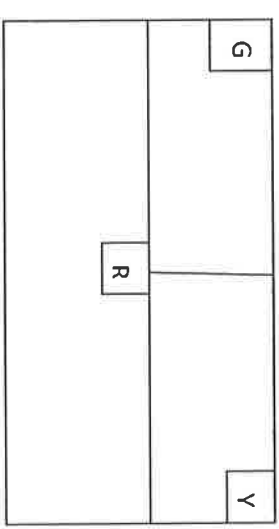
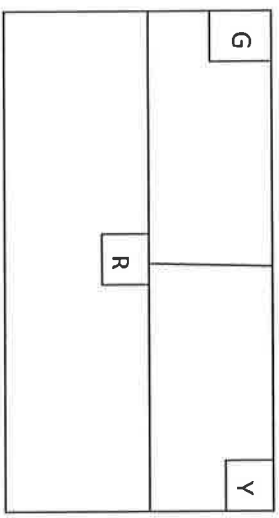
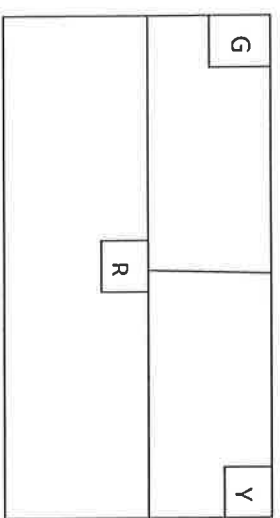


Separate

Result Unknown

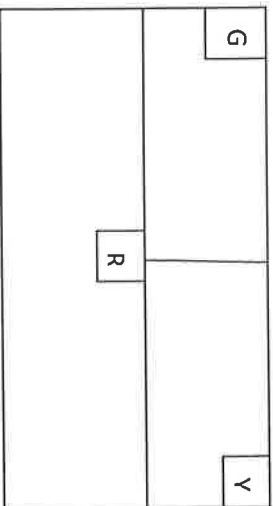
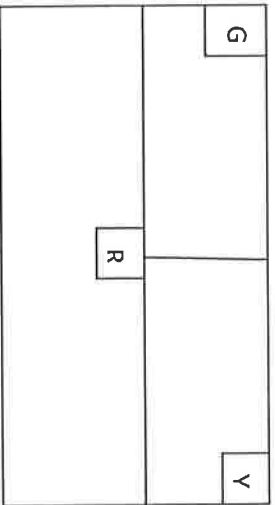
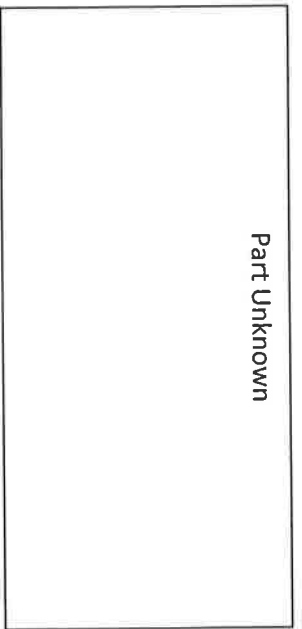
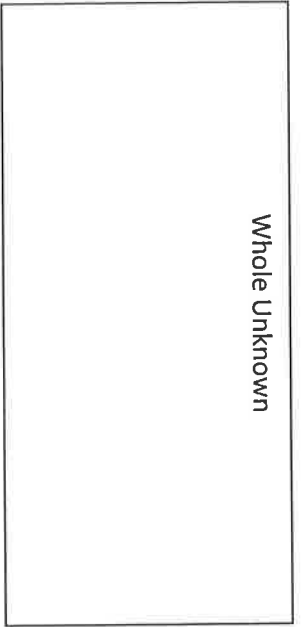
Change Unknown

Start Unknown

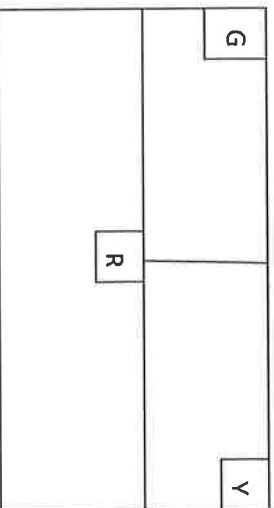
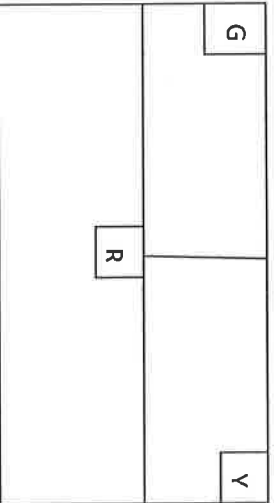
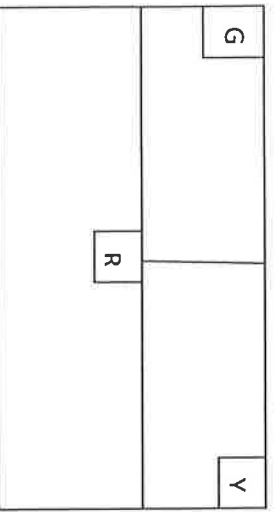


My Examples of Word Problems

Part-part-whole



Compare

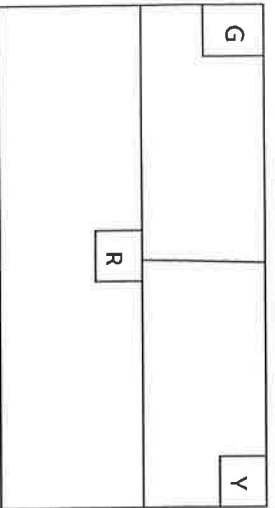


Problem Solving: Looking Beyond the Obvious

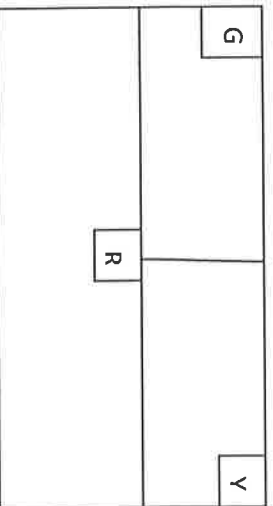
My Examples of Word Problems

Grouping/Partitioning Multiplication and Division

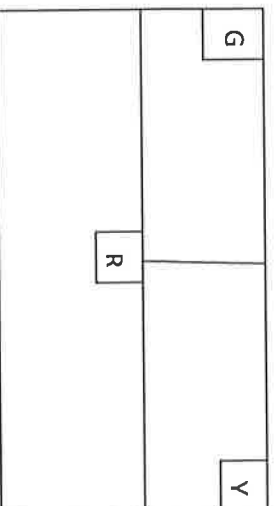
Multiplication



Measurement Division



Partitive Division



Word Problem Types

Join

- There is change over time.
- There is a direct or implied action.
- The initial quantity is increased by a particular amount.
- There are 3 distinct types.

Result Unknown	Change Unknown	Start Unknown
Frank has 4 books to read. He gets 3 more books from the library. How many books does he have now? $4 + 3 = ?$	Frank has 4 books to read. How many more books will he need to have read 7 altogether? $4 + ? = 7$	Frank has some books. He gets 3 from the library. Now he has 7 books to read. How many books did Frank have to start with? $? + 3 = 7$

Separate

- There is a change over time.
- There is a direct or implied action.
- The initial quantity is decreased by a particular amount.
- There are 3 distinct types.

Result Unknown	Change Unknown	Start Unknown
Jessica had 14 toy cars. She lost 11 of the cars. How many cars does she have left? $14 - 11 = ?$	Jessica had 14 toy cars. She gave some to Tim. Now she has 3 toy cars. How many toy cars did she give to Tim? $14 - ? = 11$	Jessica had some toy cars. She gave 11 to Tim. Now she has 3 toy cars. How many toy cars did she have to start with? $? - 11 = 3$

Part-part-whole

- There is **no** change over time.
- There is **not** a direct or implied action.
- There are **2** types.

Whole Unknown	Part Unknown
Tommy has 8 green buttons and 3 purple buttons. How many buttons does he have? $8 + 3 = ?$ <small>(green) (purple)</small>	Tommy has 11 buttons. 8 are green and the rest are purple. How many purple buttons does Tommy have? $11 - 8 = ?$ <small>(green) (purple)</small>

Compare

- There is a relationship between quantities.
- There is a comparison of two distinct, disjointed sets
- There are **3** types- referent, compared, difference.

Difference Unknown	Compared Unknown	Referent Unknown
Tommy has 11 buttons. Tess has 5 buttons. How many more buttons does Tommy have than Tess? $11 - 5 = ?$	Tess has 5 buttons. Tommy has 6 more than Tess. How many buttons does Tommy have? $5 + 6 = ?$	Tommy has 11 buttons. He has 5 more buttons than Tess. How many buttons does Tess have? $11 - 5 = ?$

Grouping/Partitioning

- There are 3 quantities.
- Three types of problems-multiplication, measurement division, partitive division.

Multiplication Unknown total	Measurement Division Unknown number of groups	Partitive Division Unknown amount in each group
Todd has 6 bags of cookies. There are 4 cookies in each bag. How many cookies does Todd have? $6 \times 4 = ?$	Todd has 24 cookies. He puts 4 cookies in each bag. How many bags can he fill? $24 \div ? = 4$	Todd has 24 cookies. He puts the cookies into 6 bags with the same number of cookies in each bag. How many cookies are in each bag? $24 \div 6 = ?$

Kim has 5 cats and 3 dogs.
How many pets does she
have?

Mark had 16 pencils. He lost
7 of them. How many pencils
does he have left?

Gail took 18 pictures at
camp. She put 9 pictures in
frames and the rest in a
book. How many pictures
did she put in the book?

Andy had 7 strawberries.
Harry gave him 9 more. How
many strawberries does he
have now?

Karim played 9 games of
soccer and 8 games of
baseball this summer. How
many games did he play?

There were 5 children
sleeping outside in tents. 3 of
them got scared and went
inside. How many children
are still outside?

There were 8 people from Chicago and some people from New York on the bus. There were 12 people in all. How many people were from New York?

Rusty drew a picture with 9 butterflies and some flowers. She drew 16 things in all. How many flowers did she draw?

Mrs. Harris lit 7 candles. Then Mr. Harris lit some more. Now there are 14 candles burning. How many candles did Mr. Harris light?

Tony has 14 baseball caps. He keeps 5 of them at school. The other caps are at home. How many baseball caps are at Tony's house?

Rob had 13 melons in his garden. He picked some of them. Now there are 5 melons in the garden. How many did he pick?

Carlos saw 18 kites flying in the park. Then some of them fell to the ground. Now there are 9 kites flying. How many kites fell?

There are some swings at the park. Today 5 more swings were added. Now there are 13 swings. How many swings were there before today?

A squirrel gathered some acorns. Then it buried 3 of them. Now he has 8 acorns left? How many acorns did he gather?

Some seals were lying in the sun. 8 more seals joined them. Now there are 14 seals in the sun. How many seals were in the sun at the beginning?

Rhonda set up a lemonade stand. By the end of the day she sold 7 glasses and had 9 glasses left. How many glasses did she have to begin with?

There are some people on a train. 8 more people got on the train. Now there are 17 people. How many people were on the train in the beginning?

The fruit seller had some apples. He sold 7 of them. He has 6 apples left. How many apples did he start with?

Betty had 6 balloons and some of them popped. Now she has 2 balloons. How many of Betty's balloons popped?

10 students ride the bus. 7 were girls and the rest were boys. How many boys ride the bus?

Jody had 6 stickers. Sally gave her 5 more. How many stickers does she have now?

8 boys and 5 girls were playing kickball. How many children were playing kickball?

Matthew had 13 pencils. He lost 7 of them. How many pencils does he have left?

Kevin has 5 peanut butter cookies and 3 chocolate cookies. How many cookies does he have?

Rene has 13 markers. Pam has 7 more markers than Rene. How many markers does Pam have?

Paula drew 12 pictures. Robert drew 5 fewer pictures than Paula. How many pictures did Robert draw?

Jordan has 14 candles on his birthday cake. His brother has 7 candles on his cake. How many more candles does Jordan have?

Saul put together 12 model airplanes. His dad put 4 planes together. How many more planes did Saul put together than his dad?

Last month 9 inches of rain fell in Brownsville. Huntsville received 2 more inches than Brownsville. How many inches fell in Huntsville?

Ronnie rented 10 movies during spring break. Jasmine rented 8 fewer movies than Ronnie. How many movies did Jasmine rent?

Four children are playing tennis together. They all brought six balls. How many total balls do they have?

A bag contains 7 balls. How many balls are there in 8 bags?

Sharon maintains her own library at home. She equally distributes her books on 8 shelves. If there are 27 books on a shelf, how many books does she have?

Roger works 8 hours in a day. How many hours does he work in 5 days?

Les made 24 batches of cookies. There are 9 cookies in each batch. How many cookies did he make?

Brian bought 9 boxes of cupcakes. There are 5 cupcakes in each box. How many cupcakes did Brian buy?

Jim had 56 balls packed into boxes of 8. How many boxes are there?

On a field trip to the park, students must stay in groups of 2. There are 16 students in all. How many groups are there?

Suzy set up rows of 9 chairs each. There are 72 chairs in all. How many rows of chairs are there?

I have 77 cookies and can fit 7 cookies into a bag. How many bags will I need?

Debby has 60 fish. She puts 12 fish in each fish tank. How many fish tanks does she need?

21 boys are put into equal teams. There are 7 boys in each team. How many equal teams are there?

George tied 30 sticks into 3 equal bundles. How many sticks were there in each bundle?

There are 28 monkeys in a zoo and 4 cages. How many monkeys in each cage?

Lucy shares 42 marbles between her and her 6 friends. How many marbles does each child get?

The football team scored 42 points in the first half. All of the points were scored from 6 point touchdowns. How many touchdowns did they score?

Cade coaches a basketball league. There are 54 students who are divided evenly into 6 teams. How many students are on each team?

3 girls share 24 toys equally. How many toys does each girl get?