EUREKA MATH² ™

Lesson 4:

Estimate products and quotients by using powers of 10 and their multiples.

CCSS Standard –5.NBT.A.2

Write the number in STANDARD FORM on your whiteboards.

1 ten thousand 3 thousands 7 hundreds 2 tens 9 ones $= $ **13,729**

Ready? Let's try some more! Get your whiteboards ready.
Use your place value charts if it helps you.

https://digital.greatminds.org/planning/teacher/guidance/1852

Now we will practice ROUNDING four-digit numbers to the nearest thousand and nearest hundred.

What is 1,832 when rounded to the nearest thousand?

$$1,000 \longleftarrow 1,832 \approx \longrightarrow 2,000 \qquad \textbf{2,000}$$

What is 1,832 when rounded to the nearest hundred?

$$1,800 \longleftarrow 1,832 \approx \longrightarrow 1,900 \qquad \textbf{1,800}$$

Ready? Let's try some more! Get your whiteboards ready.

https://digital.greatminds.org/planning/teacher/guidance/1852
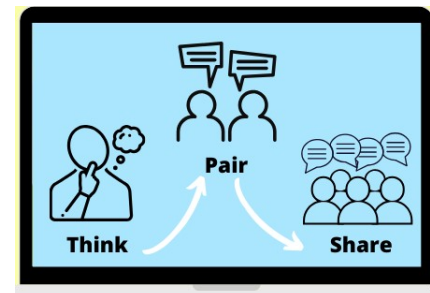
Look at how ROUNDING makes math easier.

Estimate

$$4{,}598 \times 7 \approx 4{,}000 \times 10$$

$$= 40{,}000$$

Actual

Students estimate the number of days that someone has been alive.

Pair

Think   Share

On his **11ᵗʰ birthday**, Blake wants to know how many **days** he has been alive. How can Blake determine this?

11 years x 365 days per year = actual answer
11 x 365 = ?

Blake does not have a pencil or paper, so he wants to **ESTIMATE** how many days he has been alive. With your partner, use **MENTAL MATH to ESTIMATE** how many days Blake has been alive.
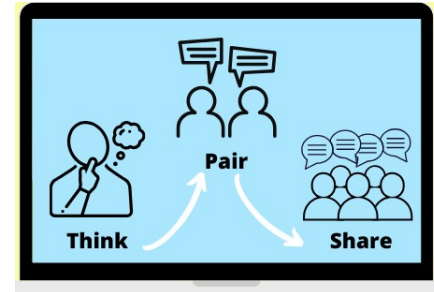
10 x 360
10 x 365
10 x 370
10 x 400

Do you see how rounding can help us turn a challenging problems into a mental math problem?

Why are these estimates slightly different?
Why do you think the factor 10 was used in each?

Students estimate the number of days that someone has been alive.

10 x 360

10 x 365

Of these two estimates, which is closer to the <u>actual product</u> and why?

10 x 365, because only one factor is rounded not both. Meaning in the actual problem we had to use 11 x 365. If we only estimate one factor, then we would be closer to the actual.

10 x 365 = 3,650

11 x 365 = 4,015

When might we use estimating in real life?

Think   Pair   Share

28 x 79

We can calculate the product of 28 and 79 by using a pencil and paper. We can **ESTIMATE** the product by using **mental math**.
Why might we estimate the product **before** we calculate it?

What can we round 28 to?   *What can we round 79 to?*

30 x 80

How can we use mental math to solve 30 x 80?

3 x 10 x 8 x 10

24 x 10 x 10   24 x 100   2,400

Estimate Products

30 x 80 = 2,400

28 x 79 = ?

28 x 79 = 2,212

Do you think our estimate is greater or less than the actual product? **Explain**.

Did we round up or down?

We rounded UP
(28 up to 30).
(79 up to 80).
Therefore, our estimate is GREATER than the actual. (We used larger numbers). But it is still **reasonable**.

Estimate Products

278 x 31

What can we round 278 to?

What can we round 31 to?

We can calculate the product of 278 and 31 by using a pencil and paper. We can ESTIMATE the product by using mental math.

Why might we estimate the product **before** we calculate it?

300 x 30

How can we use mental math to solve 300 x 30?

3 x 100 x 3 x 10

9 x 100 x 10   9 x 1,000   9,000

Estimate Products

300 x 30 = 9,000

278 x 31 = ?

278 x 31 = 8,618

Do you think our estimate is greater or less than the actual product? **Explain**.

Did we round up or down?

We rounded UP and DOWN! (278 up to 300). (31 down to 30). Our increase from 278 to 300 was a bigger increase than our decrease of 31 to 30. Therefore, our estimate is greater than the actual.

308 x 24

⬇　　⬇

What can we round 308 to?　　*What can we round 24 to?*

300 x 20

3 x 100 x 2 x 10

6 x 100 x 10　　6 x 1,000　　6,000

We can calculate the product of 308 and 24 by using a pencil and paper. We can ESTIMATE the product by using mental math.

Why might we estimate the product **before** we calculate it?

How can we use mental math to solve 300 x 20?

Estimate Products

300 x 20 = 6,000

308 x 24 = ?

308 x 24 = 7,392

Do you think our estimate is greater or less than the actual product? **Explain**.

Did we round up or down?

We rounded both numbers DOWN!
(308 up to 300).
(24 down to 20).
Therefore, our estimate is less than the actual.

Estimate Products

Your turn!
Estimate each product.
Show your thinking.

7,114 x 20

What can we round 7,114 to?

Do we have to round 20 or keep it as is?

7,000 x 20

7 x 1,000 x 2 x 10

14 x 1,000 x 10

140,000

14 x 10,000

Estimate Products

One more!
Estimate each product.
Show your thinking.

92 x 396,285

⬇ *What can we round 92 to?*

⬇ *What could we round 396,285 to?*

90 x 400,000

9 x 10 x 4 x 100,000   36,000,000

36 x 10 x 100,000   36 x 1,000,000

Write your answer on your whiteboard.

Which number is the best estimate of 976×52?

A. 4,500

B. 45,000

C. 50,000

D. 500,000

1,000 x 50

50,000

Ok, up to this point we have been estimating **products** (multiplying), now we are going to estimate **quotients** (division).

$$118 \div 7$$

We can estimate just as easily when we divide.

Which estimate below makes the most sense to use? Why?

$$140 \div 7 = 20$$
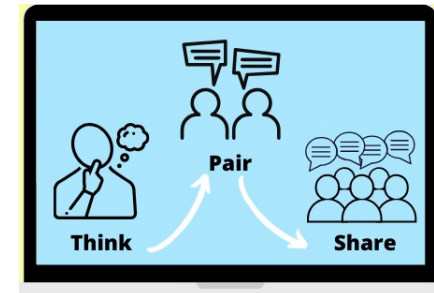$$120 \div 6 = 20$$

$$120 \div 7$$
$$140 \div 7$$
$$120 \div 6$$

We can see that these two make the most sense. There is a relationship between 14 and 7 and 12 and 6.

Estimate Quotients

Leo is making an estimate for the value of 26,516 ÷ 56.
Analyze his work. Do you think Leo's estimate is **reasonable**?

$$26{,}215 \div 56 \approx 56{,}000 \div 56$$

$$= 1{,}000$$

NO

$$25{,}000 \div 50 = 500$$

$$24{,}000 \div 60 = 400$$

Notice: With division we have to work a little harder to determine numbers that work when we divide.

Think Pair Share

Estimate Quotients – Solve ONE of these problems

$129 \div 4$	$35,471 \div 9$	$426 \div 64$
$120 \div 4 = 30$	$35,000 \div 10 = 3,500$	$420 \div 60 = 7$

Estimate Quotients – Solve ONE of these problems

Miss Baker buys **327 hats** for students at her school.
Each hat costs **$18**. **About how much** do the hats cost in total?

327 x 18 = actual

What can we round 327 to?   *What can we round 18 to?*

300 x 20 = $6,000
330 x 20 = $6,600

Estimate Quotients – Solve ONE of these problems

A runner climbs 1,276 stairs in 11 minutes.
Estimate the number of stairs the runner climbs in 1 minute.

1,276 ÷ 11 = actual

What can we round 1,276 to?   *What can we round 11 to?*
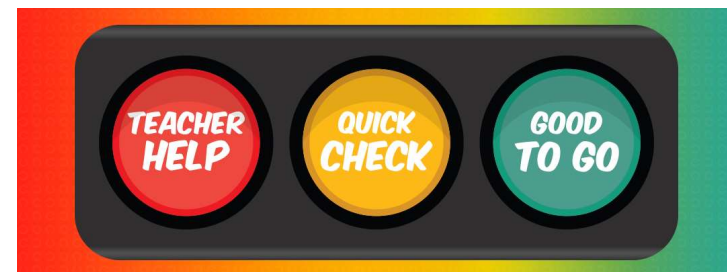
1300 ÷ 10 = 130 stairs

Why do we estimate?

- To find a reasonable answer.
- To use mental math.
- When we do not need an exact number.

What is important to keep in mind when estimating?

- Round to numbers that you can see a multiplication or division relationship.
- Rounding to a factor of 10, 100, 1,000 makes it simpler.

Exit Ticket

After Exit Ticket:

Work on pages xxxx in workbook.

Small Group Time:
Finish pages xxxxx

✉ 4

A large helicopter can carry 25,000 pounds. The average weight of a car is 4,110 pounds. If there is enough space, about how many cars can the helicopter carry at one time? Explain how you know.