



**THIRD SPACE  
LEARNING**

# Math Intervention Pack

Estimating solutions

**Grade 6**

## How To Use This Resource

### 1. Title Slide

Use this slide to activate prior knowledge needed for lesson. Students should be encouraged to initially attempt the question presented independently.

### 2. Prior Learning

Use this slide to review the knowledge that will be required to be successful in this lesson. If students feel confident on the prior learning section of the Title Slide then this slide can be skipped

### 3. Let's Learn

Use this slide to introduce the concept. Tutors should work with the student to explore the concept together, usually using diagrams to support understanding.

### 4. Follow Me + Your Turn

The tutor should work through the follow me slide, modeling the process and explaining their thinking out loud.

Students should use the your turn slide as an opportunity to work through a question similar to the follow me questions. They should apply the method modeled by the tutor in the follow me slide. Students should be encouraged to explain their thinking out loud.

### 5. You Do

Students should work through a range of questions that build in complexity.

Tutors can offer support but students should initially be encouraged to attempt these questions independently.

### 6. Go Further

Use this slide to allow students to apply their understanding to a more challenging question in an unfamiliar context.

## How To Use This Resource

### 7. Support for Slides

The support slide is used to support students during the lesson. In the tutor notes, there will be guidance as to when to use the support slide.

### 8. Check Your Understanding

Tutors should use this slide to assess the student's knowledge and whether or not they have mastered the concept within the lesson.

## Standard

6.NS.B.3 - Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

## Key Mathematical Ideas

1. To use strategies to estimate the reasonableness of the answer after using a decimal algorithm.

## Overview

### Terminology:

- Sum: The result of adding numbers.
- Difference: The result of subtracting numbers.
- Quotient: The result of dividing numbers.
- Product: The result of multiplying numbers.

### 2.2) Sentence stems:

- To easily estimate, we can round \_\_\_\_\_ to \_\_\_\_\_ and \_\_\_\_\_ to \_\_\_\_\_.
- Since we rounded (up/down) the estimate will be (smaller/larger) than the actual.
- \_\_\_\_\_ will be a closer estimate, because...



## Overview

### Common Misconceptions

Common Misconceptions	Tutoring Strategies	Checks for Understanding
All numbers must be rounded to the same place value when estimating.	Draw students attention to instances when the numbers are rounded to different positions.	Ask students to estimate an answer in more than one way and then share why both estimates are useful.
Estimates will always be very close to the actual.	Draw students attention to instances where the estimate is not super close, but it still helps assess reasonableness of the answer.	Ask students to estimate an answer in more than one way and then share why both estimates are useful.
Trouble with estimates that involve fractions, decimals and/or division.	Some operations and numbers are easier to estimate than others. Remind students of this and give them time to try and discuss different strategies for operations and numbers that are more difficult.	Give students expressions with fractions, decimals and/or division and ask them to explain an estimate.

## Title Slide

### If students...

- get both sections correct:
  - start at You do
- miss the learning goal section only:
  - start at Let's Learn
- miss the prior learning section:
  - start at Prior Learning

## Prior Learning

### If stuck

- Write in all the number line values with the student, then have them look for patterns in the ones, tenths, hundredths and thousands position. Once they are comfortable with the number line, resume rounding to the given position.

## Let's Learn

### If stuck

- Give the students the calculations. Remember the focus is on choosing reasonable numbers and comparing them to the actual answer - not the actual calculation or algorithm.

### Questions: First slide

- Why was 3 chosen as the estimate for 2.97? (Because it is only 3 hundredths away from 3.)
- Why was 4 chosen as the estimate for 4.05? (Because it is only 5 hundredths away from 4.)
- Is there another way to estimate  $2.97 + 4.05$ ? (Yes, you could round to the nearest tenth and use  $3 + 4.1$  as the estimate.)
- Why was 50 chosen as the estimate for 45.2? (Because it is only 4 and 8 tenths away from 50 and 50 is a friendly number - easier to solve mentally.)
- Why was 20 chosen as the estimate for 23.3? (Because it is only 3 and 3 tenths away from 20 and 20 is a friendly number - easier to solve mentally.)
- Is there another way to estimate  $45.2 - 23.3$ ? (Yes, you could round to the nearest whole and use  $45 - 23$  as the estimate.)
- Why is estimating before you solve a good idea? (It helps you understand what the answer should be close to, which can help you catch mistakes.)

**Questions: Second slide**

- Why was 10 chosen as the estimate for 9.7? (Because it is only 3 tenths away from 10.)
- Why was 6 chosen as the estimate for 6.08? (Because it is only 8 hundredths away from 6.)
- Is there another way to estimate  $9.7 \times 6.08$ ? (Yes, you could round 6.08 to 6.1 and use  $10 \times 6.1$  as the estimate. Note that the closer you are away from the original numbers, the more accurate your estimate will be.)
- Why was 60 chosen as the estimate for 61.7? (Because it is only 1 and 7 tenths away from 60 and 60 is a friendly number - easier to solve mentally.)
- Why was 15 chosen as the estimate for 14.3? (Even though 14 is closer to 14.3, 15 is also still pretty close and is easier to divide with 60.)
- Why is it important to estimate with numbers that are easy to solve mentally? (Estimating shouldn't take up much time, so easy numbers are better. Also, easy numbers are less likely to lead to estimating errors.)

**Watch out for**

- Students who rely heavily on rounding rules.
- Students who think that both numbers in an expression must be rounded in the same way.
- Students who jump to solving with the algorithm instead of estimating.

**Answers**

- $10 \times 6 = 60$
- The actual answer is 58.976
- $60 - 58.976 = 1.024$
  
- $60 \div 15 = 4$
- The actual answer is 4.314...
- $4.314... - 4 = 0.314...$

## Follow me

### Modeling prompts

- Encourage students to think about the general value of the two numbers in the operation. Ask questions like “What numbers are close to 45.08?... 2.192?” and “Which of the close numbers could you calculate with in your head?”
- Choose an estimation equation and solve.
- Connect the actual answer to the estimate - to show students how to use the estimate to verify an answer and help them consider how different strategies provide estimates that are closer or farther away from the actual.

### Answers

- a)  $50 - 2 = 48$
  - b) 42.888
  - c) 5.112
- 
- a)  $10 \div 30 = 0.33333...$
  - b) 0.4953...
  - c) 0.1620...

## Your turn

### If stuck

- Use similar guidance given in the Follow Me modeling prompts.

### Questions

- **a) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 35.08 is close to 35 and 102.1 is close to 100. Then we can add 35 and 100.)
- **b) Why did you choose those numbers to estimate?** (Answers will vary.)
- **c) Are there other numbers you could have chosen?** (Yes, when estimating solutions we use rounding to make the numbers easy to solve mentally and that provide accurate estimations, so there is always more than one way to round .)
- **a) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 14.09 is close to 14 and 18.2 is close to 20. Then we can multiply 14 and 20.)
- **b) Why did you choose those numbers to estimate?** (Answers will vary.)
- **c) Are there other numbers you could have chosen?** (Yes, when estimating solutions we use rounding to make the numbers easy to solve mentally and that provide accurate estimations, so there is always more than one way to round the numbers.)

### Watch out for

- Students rounding to numbers that are hard to solve mentally. For example, 14
- 18 is hard for most to solve mentally. Encourage choosing numbers easier to use mentally.

### Answers

- a)  $40 + 100 = 140$
- b) 137.18
- c) 2.82
  
- a)  $10 \times 20 = 200$
- b) 256.438
- c) 56.438

## You do

### If stuck

- Complete Support slide together for extra practice on estimating quotients.

### Questions

- **a) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 346.09 is close to 350 and 178.1 is close to 180. Then we can add 350 and 180.)
- **c) Why is your estimate above/below the actual?** (Answers will vary. Example answer: Since both numbers were rounded up, the estimate was a little larger than the actual.)
- **d) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 76.091 is close to 75 and 18.3 is close to 20. Then we can subtract 75 and 20.)
- **f) Why is your estimate above/below the actual?** (Answers will vary. Example answer: Since both numbers were rounded down, the estimate was a little smaller than the actual.)
- **g) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 9.5 is close to 10 and 201.99 is close to 200. Then we can multiply 10 and 200.)
- **j) How can we round these numbers to make them easy to estimate mentally?**  
(Answers will vary. Example answer: 325.8899 is close to 300 and 22.9 is close to 20. Then we can divide 300 and 20.)

### Watch out for

- Students rounding to numbers that are hard to solve mentally. For example,  $325 \div 22$  is hard for most to solve mentally. Encourage choosing numbers easier to use mentally.

## Answers

- a)  $300 + 200 = 500$
- b) 524.19
- c) 24.19
- d)  $80 - 20 = 60$
- e) 57.791
- f) 2.209
- g)  $10 \times 200 = 2000$
- h) 1918.905
- i) 81.095
- j)  $300 \div 20 = 15$
- k) 14.231
- l) 0.769

## Go further

### If stuck

- Ask students to estimate with their own strategy. Then have them choose one of the strategies that was close to their strategy and explain why.
- Ask students to apply the given strategies to the equation  $15.3 \div 4.9$ .

### Questions

- What questions do you have about the strategies used? (Answers will vary.)

### Watch out for

- Students who get frustrated - remind them it is a challenge and provide support with the suggestions above.

### Answers

- Rian's thinking works as the two numbers round to the nearest one are 11 and 2.
- Nessiah has ignored the decimals and rounded both to helpful numbers (112 and 20). The division is correct.
- June has used inverse operations to determine an estimate value within a range.



## Support for Slide(s)

### If stuck

- Show how the multiplication strategy can be used with  $500 \div 40$ , by asking the student what times 40 equals 500?
- Continually bring the estimating strategy back to the number line and label all parts of the estimation process there.

### Questions

- **Why was 500 chosen as the estimate for 522.99?** (It is close to 522.99 and is a friendly number.)
- **Why was 35 chosen as the estimate for 35.1?** (It is close to 35.1)
- **Why is  $500 \div 35$  not easy to solve?** (35 doesn't go into 500 equally, it will include a decimal/fractional number.)
- **Why is  $520 \div 40$  easier to solve?** ( $52 \div 4 = 13$ , so  $520 \div 40 = 13$ . There is no fractional/decimal part.)
- **a) How can a number line help us estimate?** (It can help us see what numbers 522.99 is close to.)
- **b) What do the products tell us about how to get close to 525?** (It shows that  $35 \times 10$  is too small of an estimate and  $35 \times 20$  is too large of an estimate.)
- **c) How does  $35 \text{ \_\_\_\_\_\_} = 525$  relate to  $35.1 \times ? = 522.99$ ?** (35.1 is rounded to 35 and 522.99 is rounded to 525, which we can use to estimate the missing value.)

### Answers

- $500 \div 40 = 12.5$

## Assessment question:

### Correct answer:

**First question:** Estimates can vary, but should be close to 667 with a clear explanation or work shown

**Second question:** Estimates can vary, but should be close to 4 or 5 with a clear explanation or work shown

# Today you will learn about

## Estimating Solutions

### Learning Goal

$$54.077 - 25.9$$

Estimate the difference with two different equations:

a      ..... - ..... =

b      ..... - ..... =

Predict which estimate will be closer to the actual answer. Explain your thinking.

### Prior Learning

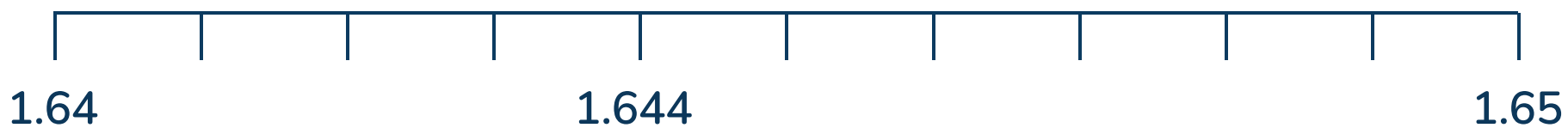
Is 4.099 closer to 4 or 5?

Explain your answer.

Prior learning

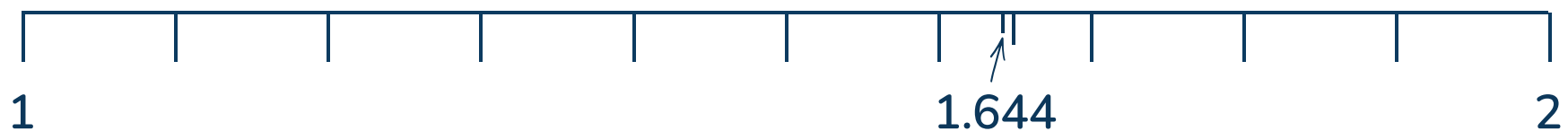
We can round numbers to different positions.

If we wanted to round 1.644 to the nearest hundredth, we look at the thousandths place to decide how to round.



- a 1.644 is between 1.64 and 1.65
- b We can see it is closer to .....
- c 1.644 rounded to the nearest hundredth is .....

If we wanted to round 1.644 to the nearest one, we look at the tenths place to decide how to round.



- a 1.644 is between 1 and 2.
- b We can see it is closer to .....
- c 1.644 rounded to the nearest one is .....

## Let's learn

When solving a calculation, it is useful to estimate the answer first. This helps us see if our answer is reasonable - which means the answer makes sense and we haven't made a mistake.

We round each number to make the equation easy to estimate mentally.

$$2.97 + 4.05$$

2.97 is close to 3

4.05 is close to 4

We can **estimate** the answer by adding 3 and 4.

$$3 + 4 = \dots\dots\dots$$

The actual answer is .....

How close is the actual answer to the estimate? .....

$$45.2 - 23.3$$

45.2 is close to 50

23.3 is close to 20

We can **estimate** the answer by subtracting 20 from 50.

$$50 - 20 = \dots\dots\dots$$

The actual answer is .....

How close is the actual answer to the estimate? .....

Discussion Question: Which estimate was closer? Why?

## Let's learn

When solving a calculation, it is useful to estimate the answer first. This helps us see if our answer is reasonable - which means the answer makes sense and we haven't made a mistake.

We round each number to make the equation easy to estimate mentally.

$$9.7 \times 6.08$$

9.7 is close to 10

6.08 is close to 6

We can **estimate** the answer by multiplying 10 and 6.

$$10 \times 6 = \dots\dots\dots$$

The actual answer is .....

How close is the actual answer to the estimate? .....

$$61.7 \div 14.3$$

61.7 is close to 60

14.3 is close to 15

We can **estimate** the answer by dividing 60 by 15.

$$60 \div 15 = \dots\dots\dots$$

The actual answer is .....

How close is the actual answer to the estimate? .....

Discussion Question: How could you use multiplication to estimate a quotient?



## Follow me



$$45.08 - 2.192$$

- a Estimate the answer with the equation:

$$\text{.....} - \text{.....} =$$

- b The actual answer is .....

- c Compare your estimate and the actual answer.

$$14.4 \div 29.07$$

- a Estimate the answer with the equation:

$$\text{.....} \div \text{.....} =$$

- b The actual answer is .....

- c Compare your estimate and the actual answer.



## Your turn



$$35.08 + 102.1$$

- a Estimate the answer with the equation:

$$\text{.....} + \text{.....} =$$

- b The actual answer is .....

- c Compare your estimate and the actual answer.

$$14.09 \times 18.2$$

- a Estimate the answer with the equation:

$$\text{.....} \times \text{.....} =$$

- b The actual answer is .....

- c Compare your estimate and the actual answer.

$$346.09 + 178.1$$

a Estimate the answer with the equation:

$$\dots\dots\dots - \dots\dots\dots =$$

b The actual answer is .....

c Compare your estimate and the actual answer.

$$9.5 \times 201.99$$

g Estimate the answer with the equation:

$$\dots\dots\dots \times \dots\dots\dots =$$

h The actual answer is .....

i Compare your estimate and the actual answer.

$$76.091 - 18.3$$

d Estimate the answer with the equation:

$$\dots\dots\dots - \dots\dots\dots =$$

e The actual answer is .....

f Compare your estimate and the actual answer.

$$325.8899 \div 22.9$$

j Estimate the answer with the equation:

$$\dots\dots\dots \div \dots\dots\dots =$$

k The actual answer is .....

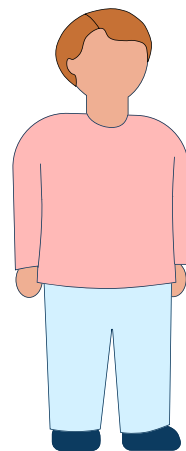
l Compare your estimate and the actual answer.



## Go further

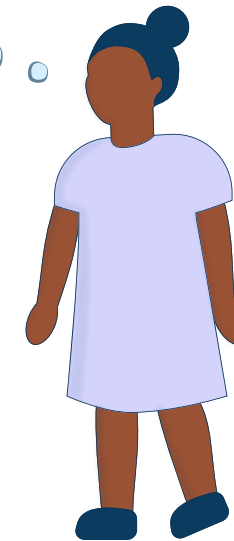
The thinking below shows how different students estimated  $11.2 \div 2.1$ .

Using just the whole numbers, the estimate is  $11 \div 2$  is  $5\frac{1}{2}$



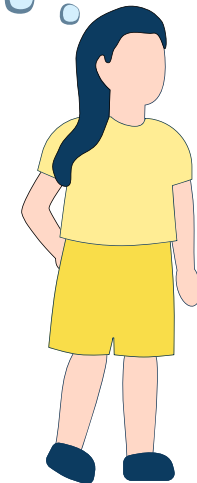
Rian

I will divide  $112 \div 21$  to solve, so I estimated with  $120 \div 20 = 6$ .



Nessiah

I know that  $2 \times 5 = 10$  and  $2 \times 6 = 12$ , so the answer is between 5 and 6.



June


Compare and contrast their strategies.

## Support


Let's look at different ways to estimate.

$$522.99 \div 35.1$$

When dividing, we can try to using rounding to create an expression that is easy to solve mentally.

$522.99 \div 35.1$   
  
.....  $\div$  .....

*Try estimating by  
rounding two  
different ways...*

$522.99 \div 35.1$   
  
.....  $\div$  .....

We can also estimate using a related operation.

Since  $522.99 \div 35.1 = ?$ , we know that  $35.1 \times ? = 522.99$ . We can use multiplication to estimate.

- a Show about where 522.99 is on the number line.



522.9 is between ..... and .....

- b 35.1 is close to the whole number 35.

$$35 \times 10 = \dots\dots\dots$$

$$35 \times 20 = \dots\dots\dots$$

- c Compare the product estimates with 522.9. How can you use the multiplication equations to estimate the missing quotient?

# Check your understanding

Show a reasonable estimate for each equation and briefly show or explain your thinking.

$$708.03 - 41.903$$

Reasonable estimate:

.....

Explanation or work shown:

$$73.2 \div 16.47$$

Reasonable estimate:

.....

Explanation or work shown:




Why do I need to try this question on my own first?

- To show your tutor what you understand
- To give you more practice
- To show your teacher how you are doing



## Do you have a group of students who need a boost in math?

Each student could receive personalized lessons every week from our specialist one-on-one math tutors.




-  Differentiated instruction for each student
-  Aligned to your state's standards
-  Scaffolded learning to close gaps

“We just had our first session and it went great! The kids really liked it and felt like they were learning! One even said he finally felt like math was making sense.”



Michelle Craig, Instructional Coach,  
Sherwood Forest Elementary, Washington

## Speak to us

-  [thirdspacelearning.com/us/](https://thirdspacelearning.com/us/)
-  (929) 298-4593
-  [hello@thirdspacelearning.com](mailto:hello@thirdspacelearning.com)



**THIRD SPACE**  
LEARNING