

What are students learning in middle school?

2019 – 20 SPS Math 6 Scope and Sequence Year at a Glance

	Instructional Event	Suggested # of days*	Target Instructional Window
Semester 1	Topic 1: Use Positive Rational Numbers	19	September 4 – October 4 (23 days)
	Topic 2: Integers and Rational Numbers	17	October 7 – November 1 (19 days)
	SPS Interim Window 1	1	October 21 – November 22
	Topic 3: Numeric and Algebraic Expressions	19	November 4 – December 4 (20 days)
	Topic 4: Represent and Solve Equations and Inequalities	25	December 5 – January 28 (28 days)
Semester 2	SPS Interim Window 2	1	February 3 – March 13
	Topic 5: Understand and Use Ratio and Rate	25	January 30 – March 11 (25 days)
	Topic 8: Display, Describe, and Summarize Data	19	March 12 – April 8 (20 days)
	SPS Interim Window 3 [Optional]	1	March 25 – June 14
	Topic 6: Understand and Use Percent	17	April 9 - May 8 (18 days)
	Topic 7: Solve Area, Surface Area, and Volume Problems	21	May 11 – June 12 (24 days)
	Total number of days	165	177

2019-20 SPS Math 7 Scope and Sequence Year at a Glance

	Instructional Event	Suggested # of days*	Target Instructional Window
Semester 1	Topic 1: Integers and Rational Numbers	25	September 4 – October 16 (30 days)
	Topic 2: Analyze and Use Proportional Relationships	17	October 17 – November 13 (19 days)
	SPS Interim Window 1	1	October 21 – November 22
	Topic 3: Analyze and Solve Percent Problems	17	November 14 – December 11 (18 days)
	Topic 4: Generate Equivalent Expressions	21	December 12 – January 28 (23 days)
Semester 2	SPS Interim Window 2	1	February 3 – March 13
	Topic 5: Solve Problems Using Equations and Inequalities	19	January 30 – March 4 (20 days)
	Topic 8: Solving Problems Involving Geometry	23	March 5 – April 6 (23 days)
	SPS Interim Window 3 [Optional]	1	April 6 – June 12
	Topic 6: Use Sampling to Draw Inferences About Populations	13	April 7 – May 1 (14 days)
	Topic 7: Probability	19	May 4 – June 3 (22 days)
	Total number of days	154	169

2019-20 SPS Math 8 Scope and Sequence Year at a Glance

	Instructional Event	Suggested # of days*	Target instructional window
Semester 1	Topic 1: Real Numbers	25	September 4 – October 16 (30 days)
	Topic 2: Analyze and Solve Linear Equations	23	October 17 – November 20 (24 days)
	SPS Interim Window 1	1	October 21 – November 22
	Topic 3: Use Functions to Model Relationships	17	November 21 – December 20 (20 days)
	Topic 4: Investigate Bivariate Data	15	January 6 – January 31 (18 days)
	SPS Interim Window 2	1	February 3 – March 13
Semester 2	Topic 5: Analyze and Solve Systems of Linear Equations	13	February 3 – February 28 (15 days)
	Topic 7: Understand and Apply the Pythagorean Theorem	13	March 2 – March 18 (13 days)
	Topic 8: Solve Problems Involving Surface Area and Volume	13	March 19 – April 6 (15 days)
	SPS Interim Window 3	1	March 25 – June 14
	Topic 6: Congruence and Similarity	25	April 7 – May 18 (25 days)
	Total number of days	150	158 days

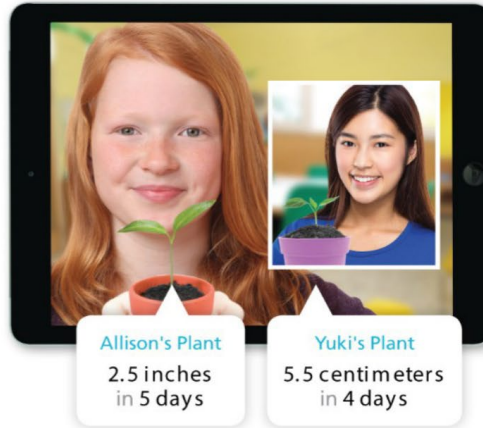
Sample from enVision math 2.0 - Seattle Public Schools middle school math curriculum.

“Solve and Discuss It” (or “Explore It” or “Explain It”)

Open ended / Multiple strategies can be used / May have multiple right answers

Solve & Discuss It!

Allison and her classmates planted bean seeds at the same time as Yuki and her classmates in Tokyo did. Allison is video-chatting with Yuki about their class seedlings. Assume that both plants will continue to grow at the same rate. Who should expect to have the taller plant at the end of the school year?



Example 1

Teacher removes the scaffolds from the problem to promote multiple strategies being used by students. Typically, there is only one right answer

EXAMPLE 1

Find a Unit Rate Involving Unit Fractions

[Scan for Multimedia](#)

Sergio is training for a triathlon. His target speed is 25 miles per hour. Did he achieve his target speed for the first 7 miles of his ride?

Reasoning You can use a unit rate to describe Sergio's cycling speed. © MP.2

Sample strategies from example 1 that teacher hopes to see

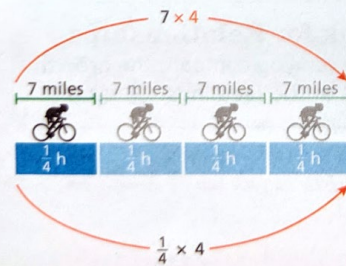
Make a table of equivalent ratios to find the unit rate.

Miles	7	28
Hour	$\frac{1}{4}$	1

$\times 4$ (from 7 to 28)
 $\times 4$ (from $\frac{1}{4}$ to 1)

Sergio bikes $\frac{28 \text{ miles}}{1 \text{ hour}}$, or 28 miles per hour, so he has achieved, and exceeded, his target speed.

You know that 15 minutes is equal to $\frac{1}{4}$ hour. Draw a diagram to show how the distance Sergio bikes is related to the time he bikes.



Example 2

- Typically, less open ended than Example 1
- Typically builds on Example 1, extending the ideas or going deeper
- Has one right answer
- Students begin to move toward more efficient strategies for getting right answers

EXAMPLE 2



Find and Apply a Unit Rate Involving Fractions



ACTIVITY



ASSESS

Bronwyn mows the lawn every other weekend. She can mow 12,000 ft² in $\frac{2}{3}$ hour. The lawn is 36,000 ft².

How long does it take her to mow the entire lawn?

$$\frac{12,000}{\frac{2}{3}} = \frac{12,000 \times \frac{3}{2}}{\frac{2}{3} \times \frac{3}{2}} = \frac{18,000 \text{ ft}^2}{1 \text{ h}}$$

$$\frac{18,000 \times 2}{1 \times 2} = \frac{36,000}{2}$$

Multiply each term by 2 for the area of the entire lawn.

Bronwyn mows at a rate of 18,000 ft² per hour. It takes her 2 hours to mow the entire lawn.

Look for Relationships How do the operations used in the table relate to the operations used in the equations at the left? © MP.7

Area (ft ²)	12,000	18,000	36,000
Time (h)	$\frac{2}{3}$	$\frac{6}{6}$ or 1	2

Arrows indicate relationships: $\times \frac{3}{2}$ from 12,000 to 18,000; $\times 2$ from 18,000 to 36,000; $\times \frac{3}{2}$ from $\frac{2}{3}$ to $\frac{6}{6}$; $\times 2$ from $\frac{6}{6}$ to 2.

Example 3 Students apply efficient strategies to obtain the right answer

EXAMPLE 3



Solve Problems Using Unit Rates

Omar knows that his friend Chris lives $\frac{3}{5}$ mile away. How far is the school from his house?

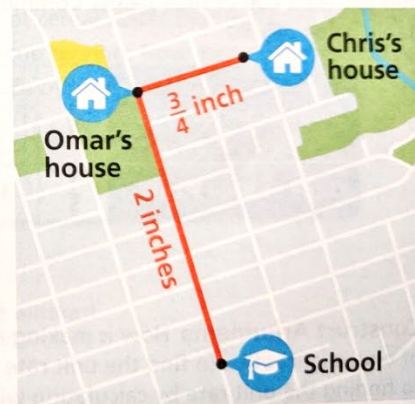
$$\frac{\frac{3}{5} \text{ mi}}{\frac{3}{4} \text{ in.}} = \frac{\frac{3}{5} \times \frac{4}{3}}{\frac{3}{4} \times \frac{4}{3}} = \frac{\frac{4}{5} \text{ mi}}{1 \text{ in.}}$$

Divide both terms by $\frac{3}{4}$ to find the unit rate.

$$\frac{\frac{4}{5} \text{ mi} \times 2}{1 \text{ in.} \times 2} = \frac{\frac{8}{5} \text{ mi}}{2 \text{ in.}} = \frac{1\frac{3}{5} \text{ mi}}{2 \text{ in.}}$$

Multiply both terms of the unit rate by 2 to find an equivalent rate.

Omar's school is $1\frac{3}{5}$ miles from his house.



Three Reads Notetaker



1st Read. What is the problem about?



2nd Read. What is the question?



3rd Read. What is the important Information?

Notes: Using Tape Diagrams

Students do a lot of tape diagrams in the K-5 Math in Focus curriculum, although they will call them Bar Models, rather than Tape Diagrams.

These models effectively model the relationships among the parts being compared to the whole. The whole is divided up into equivalent cells, which are labeled to illustrate the various parts.

Example question: The ratio of children to adults at the football game was 2:3. If there were 140 children at the football game, how many adults were there?

Draw unit bars for each quantity involved in the problem. Create as many unit bars as needed to represent the ratio relationship.

Children:

--	--

Adults:

--	--	--

Then add the information and what you are looking for to the diagram.

Children:

--	--

 140

Adults:

--	--	--

 ?

Now use this diagram to solve the problem. If the Children bar is worth 140, then each unit bar is 70. Adult unit bars are equivalent, so there are 3×70 or 210 adults.

Children:

70	70
----	----

 140

Adults:

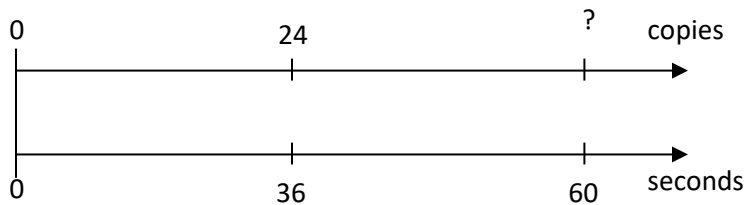
70	70	70
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 ? 210

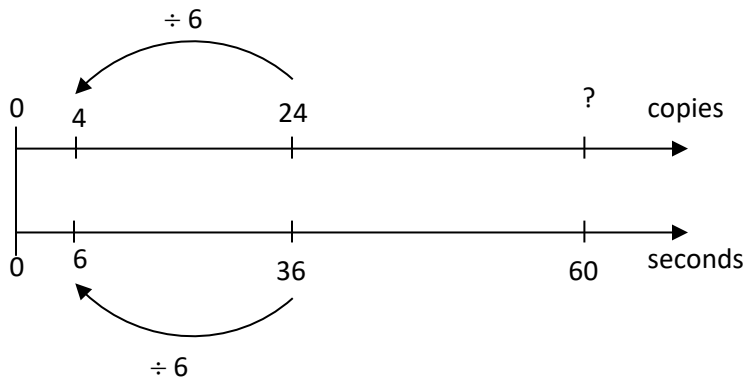
Notes: Using Double Number Lines

Example question: When I printed off homework, it took the copy machine 36 seconds to print off 24 copies. At this rate, how many copies can be made in 60 seconds?

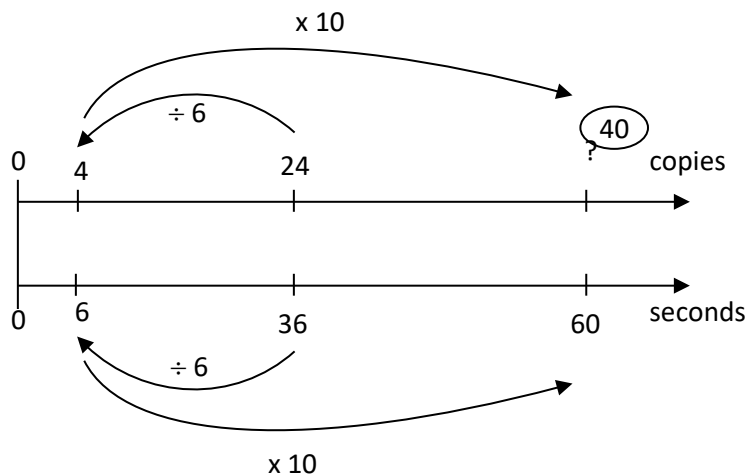
First, set up two parallel number lines – one for each quantity. Record the information from the problem onto the double number line.



Use multiplication and/or division to locate other ratio pairs on the number line. For example, I divided both values by 6. There are any number of choices (remind kids about common factors!) – although some may get students there faster than others.



Then use these values to find the answer to the question (by multiplication and/or division). I took my new values and multiplied them by 10. This tells me that there would be 40 copies made in 60 seconds. Some students may just choose to add up instead. This is less sophisticated, but it still works.

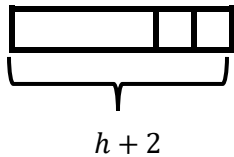


Notes: Using Tape Diagrams and/or Number Lines to Solve Equations

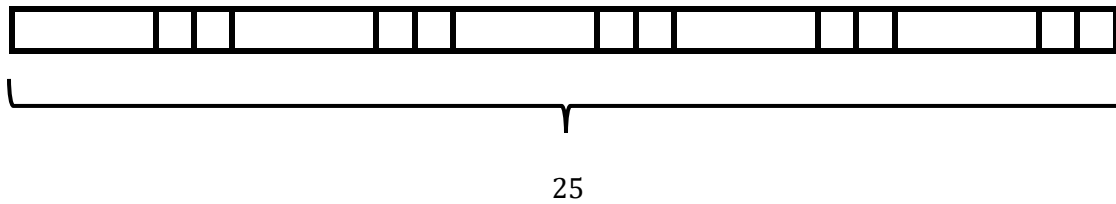
Every day Heather practices soccer and piano. Each day she practices piano for 2 hours. If after 5 days she practiced both piano and soccer for a total of 25 hours, how many hours, h , per day did Heather practice soccer?

Students are expected to write an equation to represent this situation, which can be a difficult task. However, the tape diagram can help provide a visual of the problem first.

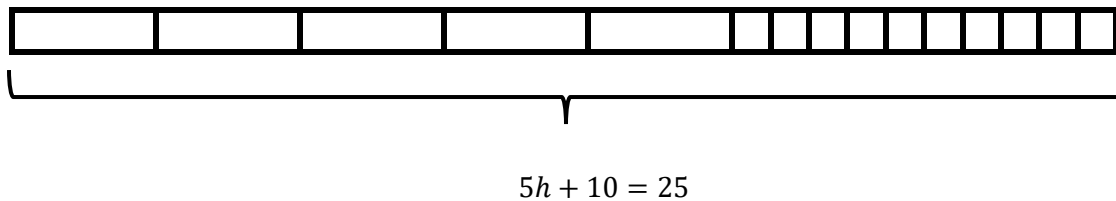
Start by representing the amount of time practicing both piano and soccer in one day. We know that Heather is practicing piano for 2 hours and soccer for h hours each day.



Now, we can show that Heather spends this same amount of time practicing on each of the five days. And we know that the total for all five days is 25 hours.

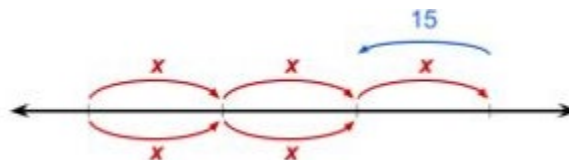


Rearranging the parts . . .



We can see that the 5 pieces that are h long make up 15 hours, so each must be 3 hours.

To solve $3x - 15 = 2x$



Math Constructive Conversation Skills Poster

Clarify Problem and Ideas for Solving It



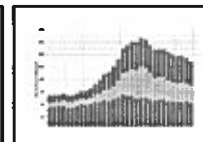
Prompt starters:

What are we trying to do?
 What is the problem asking?
 How does the problem begin?
 What happens in the problem?
 What do we need to know?
 How can we break this down?
 What type of problem is this?
 What patterns do we notice?
 What's a possible plan for solving it?
 What is your estimate for the answer?
 Why are you doing that?
 Where did that number come from?

Response starters:

In order to ____, we need to ...
 In other words,
 More specifically, it is ... because...
 Let's see, it is similar to the problem about ... that we did because...
 It is important to ____ because
 Let's stay focused on
 Let's get back to the idea of...
 In future problems like this one we need to remember to...

Generate & Try Multiple Methods & Representations



$$\int_0^{\infty} \sum_{i=0}^{\infty} \frac{A_i(x)}{2\pi}$$

Prompt starters:

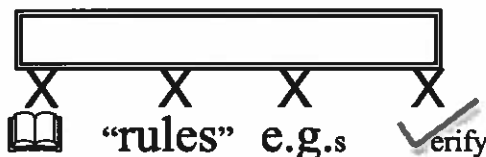
How else can we show this?
 How can we draw or graph this?
 What symbols can we use?
 How can we explain this to others?
 How can we write what we are thinking/doing?
 How can we translate this into symbols?
 Let's back up and try a different way.
 Which method is most useful? Why?

Response starters:

Maybe we can use...
 Another way to show this is...
 In math symbols we could write...
 We can draw it like this because it says...
 Let's try to... and see what happens.

Build Math Ideas & Understandings

Explain & Support Reasoning



Prompt starters:

Can you explain why you...?
 What does that mean?
 What are you doing?
 What math rule are you using?
 Can you give an example?
 How does the sample problem help us?
 What are examples of this problem from real life?
 Can you clarify where you...?
 How did you get this answer?

Response starters:

If we ____, then we need to ____ because...
 A key mathematical principle is making sure that you...
 In real life this is similar to when you want to...
 An example from my life is
 One case that illustrates this is...
 In math, we always need to...
 Let me show you what I mean.
 We can't do that because it...

Negotiate Ideas



Prompt starters:

How can we add to the idea of...
 What do you think about this strategy for solving it?
 What else could support this idea?
 Do you agree?
 What contradicts this? What are other points of view?
 What did we learn from doing this problem? How will it help in life?
 Let's create a similar problem.

Response starters:

That reminds me of...
 I want to add on to your idea of...
 That idea connects to...
 I see it a different way,
 On the other hand, ...
 That makes me think of...
 We can agree that...

Learning to Question and Questioning to Learn in Mathematics

Persevering

- How would you describe the problem in your own words?
- What facts do you have? What do you know that is not stated in the problem?
- How did you tackle similar problems?
- Could you try it with simpler numbers? Fewer numbers? With a number line?
- What about putting things in order?
- Would it help to create a diagram? Make a table? Draw a picture?
- Can you guess and check?
- Have you compared your work with anyone else?

Problem Solving

- What information do you have? What do you need to find out?
- What strategies are you going to use?
- Will you do it mentally? With pencil and paper? Using a number line, table, diagram or picture?
- Will a calculator help?
- What tools will you need?
- What do you think the answer or result will be?

Reasoning & Justifying

- Can you tell me why that is true?
- How did you reach your conclusion?
- How does your answer connect to the question? Does it make sense?
- Can you make a model to show that?

Communication & Collaboration

- What do you think about what _____ said?
- Do you agree? Why/why not?
- Does anyone have the same answer but a different way to explain it?
- Do you understand what _____ is saying? Can you explain what _____ is saying?
- Can you convince the rest of us that your answer makes sense?

Reflection and Learning from Errors

- How did you get your answer? Can you explain why your method works?
- Does your answer seem reasonable? Why or why not?
- What if you had started with...rather than...? What if you could only use...?
- What have you learned or found out today?
- What new words did you use today? How did you use them?
- What did you learn from that mistake/error? How did you know it was an error?
- Can you explain where your thinking changed?
- What are the key points or big ideas in this lesson?

Taking Responsibility

- How are your notes/notebook organized?
- How you identify what is important to remember? (colors, shapes, etc)
- How does what you learned in class today connect to what you already knew?
- How do you identify what you have questions about?
- How do you keep track of new vocabulary?

Handout - Seven Common Growth Mindset Scenarios and Responses

As a mentor, you will encounter multiple situations where you can encourage and reinforce a growth mindset. But even if you understand the concepts of growth mindset, it may not always be clear what to say when confronted with a student who is struggling to persevere or who is shying away from challenges. This tip sheet illustrates some of the messages you can deliver about mindset in response to common situations you may face as a mentor.

<p>Situation 1: Faced with a new learning challenge</p> <p><i>Underlying principles:</i></p> <ul style="list-style-type: none"> • Challenges are exciting, not just overwhelming. • Effort is important: you'll get out of this what you put into it. • Having a strategy is vital. <ul style="list-style-type: none"> ○ Divide the learning into pieces that can be taken as chunks and defining them ○ Set up opportunities for there to be small wins that lead to the completion of the larger learning goal • It's OK to ask for help. A little struggle is a sign we are stretching and leaving our comfort zone. But after a while, it's OK to get help or hear new strategies. 	<p>Some potential responses:</p> <ul style="list-style-type: none"> • Let's identify a target for today that will get you closer to completing the learning challenge? After you complete the day's target, what might tomorrow's target be? • This is a great challenge! Your brain is going to get stronger as you work through the challenge. • Let's take one step at a time that way we can see where we might need to focus more attention and time. • This looks like pretty demanding stuff. What would a focused first try look like? • I am here to help you learn how to ... • Let's come up with a strategy. • Describe this challenge in your own words. Share anything that might be really confusing. • This may be difficult now, but might be a lesson you remember for the rest of your life. • I have seen you learn challenging things in the past. For example, last _____ [week/month] I saw you... • This is challenging! What do you think are some strategies you could try?
<p>Situation 2: Expressing high expectations</p> <p><i>Underlying principles:</i></p> <ul style="list-style-type: none"> • The research is clear, setting high expectations tells kids the adults they care about believe in them • Unrealistically high expectations without support; however, are a different matter 	<p>Some potential responses:</p> <ul style="list-style-type: none"> • Let's think through this to determine what you know and where you might need support. • Let's discuss some strategies for tackling this. • What do you already know about this? • When you learn this/do this/ succeed at this, you can be proud because it isn't easy.

	<ul style="list-style-type: none"> • This looks like one of those opportunities to stretch/to reach higher. • This is a challenge that could produce some great mistakes that will really help you learn.
<p>Situation 3: Succeeding easily without effort</p> <p><i>Underlying principle:</i></p> <ul style="list-style-type: none"> • Having it be too easy is counterproductive • Acknowledging the lack of challenge and determining the appropriate level of challenge is important 	<p>Some potential responses:</p> <ul style="list-style-type: none"> • You finished that quickly. Let's find something a little more challenging. • That seems a little easy for you. How can you make it a stretch enough to build your brain? • I am sorry this was not challenging for you. Your skills didn't seem taxed. Is that true? • What can you do to make this [more meaningful, challenging, exciting]? • How can you add another level to this to challenge you even more? • Do you already know how to do this? Let's come up with something more challenging if you already know how to do what was presented.
<p>Situation 4: Slow progress despite strong effort</p> <p><i>Underlying principle:</i></p> <ul style="list-style-type: none"> • Effort is the key to success • Identify supports to help foster a sense of success and accomplishment • Analyze the strategies being used and see if they can be improved (see below) 	<p>Some potential responses:</p> <ul style="list-style-type: none"> • I see that you tried that five times. I admire your persistence. It will pay off. • Let's review all of your attempts to determine the best course of action. • Remind yourself that you just can't do it "YET." Let's think through some next steps to take. • Let's walk through the problem/assignment/issue/task, perhaps you need a little more information or guidance to get to the next step. • If it were easy, you wouldn't be learning enough. • What progress did you make? What was different? • I expect you to make mistakes. Mistakes are the signals of opportunities for learning - what did you notice in the mistakes you made? Is there anything in the mistakes that will identify where you might need additional guidance or support? • Does it make sense to stop now and come back to it later? • Let's talk about how you've been approaching the problem/assignment/

	<p>issue/task. Maybe one of your strategies could be improved.</p>
<p>Situation 5: Offering help with strategies when struggling</p> <p><i>Underlying principle:</i></p> <ul style="list-style-type: none"> When challenge because difficult and your mentee wants to give up, support him or her by identifying strategies that will support persistence and resilience 	<p>Some potential responses:</p> <ul style="list-style-type: none"> Okay, let's think about how to approach this differently? Would you like to try _____ [different strategy]? Let's try it together. Let's do it a few more times to get the synapses strong - get that learning into long-term memory. What was difficult? Let's focus on the difficulties to see if we can figure it out. Who else can you ask for help? Let's put a plan together for the next _____ [days, weeks]. Let's go through it together and find the mistakes. What was your approach? Where do you think you might be struggling the most? Let's de-stress, so your brain can relax and process better [square-breathing, changing the physical location in which the work was being done, etc.] Does it make sense to stop now and come back to it later?
<p>Situation 6: During progress</p> <p><i>Underlying principle:</i></p> <ul style="list-style-type: none"> As your mentee begins to make progress toward a goal or an important task, it's important to praise the process in order to build persistence 	<p>Some potential responses:</p> <ul style="list-style-type: none"> Show me how you arrived at your present conclusion? Starting to come along nicely - your strategy is working! It seems like the problem/task/concept is at a right level; you've been working on it for a while. Good job! I see you are using your notes. What other strategies have you used or could you use to continue to make progress? I can see a difference in now compared to _____ from last week/yesterday. What has changed? Talk me through what happened.
<p>Situation 7: Succeeding with strong effort</p> <p><i>Underlying principle:</i></p> <ul style="list-style-type: none"> It is important to acknowledge the effort once a new challenge is overcome and complete 	<p>Some potential responses:</p> <ul style="list-style-type: none"> What was it like for you when you started work on _____? Look how different it is for you to do that now. Did all that hard work pay off?

- When mentees understand that they have strategies in their toolbox for tackling big challenges, they will be able to use specific tools for specific challenges

- What do you think contributed to your success in _____?
- I saw you use a variety of techniques; way to go!
- This had that one brilliant mistake. Let's talk about what you learned from that mistake.
- Did you compromise on anything to get this done?
- The next time you have a challenge this big, what can you use from this experience.
- Congratulations for trying again and again to get this done.
- How would you compare this to other accomplishments?

Developed by MENTOR: The National Mentoring Partnership

