

Focus
Standards
and Claim

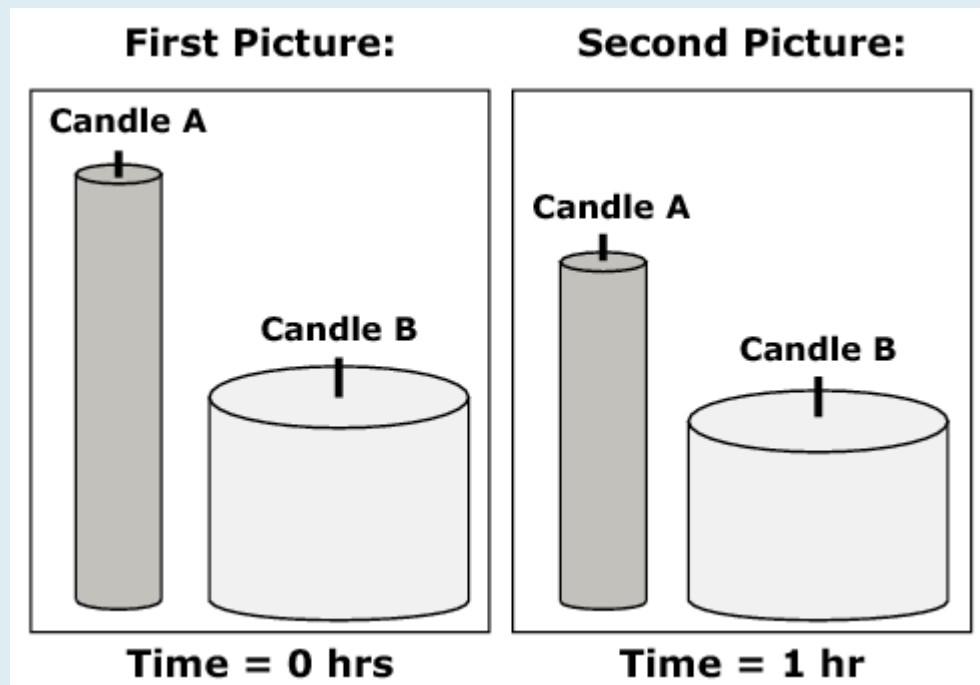
Claim 3
7.EE.B.4

Stimulus

Lights, Candles, Action!

Your friend Abbie is making a movie. She is filming a fancy dinner scene and she has two types of candles on the table. She wants to determine how long the candles will last.

She takes a picture, lights the candles, and then lets them burn for 1 hour. She then takes a second picture. You can assume that each candle burns at its own constant rate.



Candle Type A initial height = 20 cm

Candle Type B initial height = 10 cm

Candle Type A height after burning for 1 hour = 16 cm

Candle Type B height after burning for 1 hour = 9 cm

You will use this information to help Abbie think about the candles she might use for her film.

Item Prompt

Candles of each type were lit at the same time. Abbie thinks that since Candle Type A burns more quickly than Candle Type B, that it will burn out (have a height of 0 cm) first.

Julie thinks that since Candle Type B starts out much shorter than Candle Type A, it will be the candle to burn out first.

Which candle will burn out first? Give a mathematical explanation to convince Abbie and Julie of your solution. Clearly identify the quantities involved.

Sample Responses

Sample Response A

A initial: 20 cm -4cm/hr

B initial: 10cm -1cm/hr

$$20 - 4 = 16 - 4 = 12 - 4 = 8 - 4 = 4 - 4 = 0$$

$$10 - 1 = 9 - 1 = 8 - 1 = 7 - 1 = 6 - 1 = 5$$

$$\text{---1hr-----2hr-----3hr-----4hr-----5hr-----}$$

Candle A will burn out first. Every hour, candle A decreases in height by 4cm while candle B decreases in height by 1 cm. After 5 hours, candle A will be 0cm and candle B will still be 5 cm tall.

Sample Response B

Candle A will burn out first because the rate of the decrease in height per hour is greater. Candle A burns at 4cm/hour. Candle B burns at 1cm/hour.

$$\text{Candle A } y = 4x + 20$$

$$\text{Candle B } y = x + 10$$

Sample
Response C

Type A.

Type A

0 hrs – 20

1 hr – 16

2 hr – 12

3 hr – 8

4 hr – 4

5 hr – 0

Type B

0 hrs – 10

1 hr – 9

2 hr – 8

3 hr – 7

4 hr – 6

5 hr – 5

6 hr – 4

7 hr – 3

8 hr – 2

9 hr – 1

10 hr – 0

<p>Sample Response D</p>	<p>I think Candle A will burn out first because it burns out more quickly than Candle B. That's because candle A has a much smaller circumference than Candle B.</p> <p>Ex.</p> <p>Every hour, candle A burns 4 cm and candle B burns only 1cm</p> <p>You could make a chart to represent this.</p> <table border="1" data-bbox="483 499 831 863"> <thead> <tr> <th></th> <th>Candle A</th> <th>Candle B</th> </tr> </thead> <tbody> <tr> <td>0hr</td> <td>20cm</td> <td>10cm</td> </tr> <tr> <td>1hr</td> <td>16cm</td> <td>9cm</td> </tr> <tr> <td>2hr</td> <td>12cm</td> <td>8cm</td> </tr> <tr> <td>3hr</td> <td>8cm</td> <td>7cm</td> </tr> <tr> <td>4hr</td> <td>4cm</td> <td>6cm</td> </tr> <tr> <td>5hr</td> <td>0cm</td> <td>5cm</td> </tr> </tbody> </table>		Candle A	Candle B	0hr	20cm	10cm	1hr	16cm	9cm	2hr	12cm	8cm	3hr	8cm	7cm	4hr	4cm	6cm	5hr	0cm	5cm															
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<p>Sample Response E</p>	<p>Candle A and B are burning at different time. Candle A is thinner and B is thicker but smaller so it burns first.</p>																																				
<p>Sample Response F</p>	<p>$20 - 4h = 0 \quad 4h = 20 \quad h = 5$</p> <p>$10 - h = 0 \quad h = 10$</p>																																				
<p>Sample Response G</p>	<p>Candle Type A will burn out first because mathematically, every hour candle A's height decreases by 4 centimeters while candle B only decreases by 1 cm.</p> <p>Candle A:</p> <table border="1" data-bbox="483 1392 1023 1486"> <tr> <td>Number of Hours Burned:</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>Height after each hour:</td> <td>16</td> <td>12</td> <td>8</td> <td>4</td> <td>0</td> <td>X</td> </tr> </table> <p>Candle B:</p> <table border="1" data-bbox="483 1570 1221 1665"> <tr> <td>Number of Hours Burned:</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> </tr> <tr> <td>Height after each hour:</td> <td>8</td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> </table> <p>Using the table, we could clearly see that candle A burns out way quicker than candle B because candle A burns out within 5 hours of being lit while candle B burns out within 10 hours of being lit.</p>	Number of Hours Burned:	1	2	3	4	5	6	Height after each hour:	16	12	8	4	0	X	Number of Hours Burned:	1	2	3	4	5	6	7	8	9	10	Height after each hour:	8	8	7	6	5	4	3	2	1	0
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Sample Response H	Candle Type A will be the first one to reach the height of 0 cm first since it burns out at a faster rate. Type B will be at 4 cm by the time type A has completely burnt out.
Sample Response I	Candle A will burn out first because even though the candle is long in height, it burns out 3 times the length of candle B. Example, candle A is 20cm but it burns out 4cm/hr which results to 16 and now it will burn out after 4 hours. Candle B will burn out after 9 hrs since it only burns 1 cm/hr and the height of candle B is 10.