? Essential Question How can you compare and order rational and irrational numbers?

INTERACTIVE ANIMATION ASSESS

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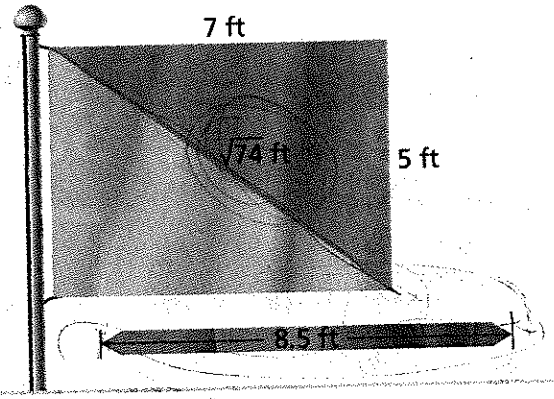
EXAMPLE 1 Approximate an Irrational Number

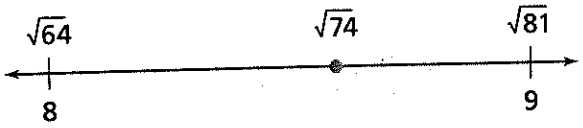
Darcy wants to add the ribbon shown along the diagonal of the rectangular flag she is designing. Does Darcy have enough ribbon? Explain.



Approximate $\sqrt{74}$ using perfect squares.

Because 74 lies between the two consecutive perfect squares 64 and 81, $\sqrt{74}$ is located between $\sqrt{64}$ and $\sqrt{81}$.

Because 74 is closer to 81 than 64, $\sqrt{74}$ is closer to $\sqrt{81}$, or 9.

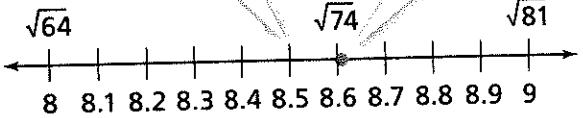


Find a better approximation by squaring decimals between 8 and 9. Then compare.

Reasoning Which decimals can you use to find a better approximation? MP.2

$8.5 \times 8.5 = 72.25$ This approximation is too low.

$8.6 \times 8.6 = 73.96$ This is a good approximation.



The length of the diagonal, $\sqrt{74}$, is about 8.6 feet. Darcy does not have enough ribbon. 8.6 feet

Try It!

Between which two whole numbers is $\sqrt{12}$?

$11 < 12 < 13$

$\sqrt{9} < \sqrt{12} < \sqrt{16}$

$3 < \sqrt{12} < 4$

Convince Me! Which of the two numbers is a better estimate for $\sqrt{12}$? Explain.

$3.5 \times 3.5 = 12.25$

$3.4 \times 3.4 = 11.56$

$\sqrt{12} \approx 3.5$

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$3\sqrt{28}_8$

$\sqrt{25}$ $\sqrt{36}$

5 6

1 1

5.3 5.2 $\sqrt{28} \approx 5.3$

$\times 5.3$ $\times 5.2$

159 104

2650 2600

28.09 27.04

.09 .96

$15\sqrt{79}_2$

$\sqrt{64}$ $\sqrt{81}$

8 9

8.8 8.9

$\times 8.8$ $\times 8.9$ $\sqrt{79} \approx 8.9$

704 801

7040 7120

77.44 79.21

1.56 .21

Order from least to greatest

$\pi^2, 9\frac{1}{2}, 9.8, 9.\overline{5}, \sqrt{94}$

$9.\overline{5}$

$\sqrt{81}$ $\sqrt{100}$

9 10

9.7

3.14×3.14

		1	2
		5	6
	3	1	4
	0		
9	4	2	0	0
9	8	5	9	6

9.7×9.7

		1	
		6	7	9
	8	7	3	0
9	4	0	9	

9.6×9.6

		1	
		5	7	6
	8	6	4	0
9	2	1	6	

$9\frac{1}{2}, 9.5, \sqrt{94}, 9.8, \pi^2$

$\sqrt{94} \approx 9.7$