Averages with...

Fractions

Find the mean, median, and range of:

$$3\frac{1}{3},\ 6\frac{1}{6},\ \text{and}\ 2\frac{1}{2}$$

Area and Perimeter

A rectangle has a width of 3 cm and a height of 2 cm.

Draw a second rectangle so that the two rectangles have a mean area of 13 cm^2 and have perimeters with a range of 8 cm.

Standard Form

Find the median of the following:

$$3\times10^{-4},$$

$$4\times10^{-3},$$

$$5\times10^{-6},$$

$$6\times10^{-5}.$$

Surds

Zoe says:

'The mean of $\sqrt{12}$, $\sqrt{27}$,

and $\sqrt{48}$ *is* $\sqrt{29}$.'

Explain and correct the mistake that Zoe has made.

Bounds

Find the upper and lower bounds for the median of the following numbers:

3.5 (rounded to one decimal place),

27 (to two significant figures),

30 (to the nearest ten).

Equations

Find the upper bound for the median angle in a quadrilateral.

Is it possible to actually draw a quadrilateral with that median angle?

Answers!

Fractions

Find the mean, median, and range of:

$$3\frac{1}{3},\ 6\frac{1}{6},\ \text{and}\ 2\frac{1}{2}$$

Mean = 4

Median = $3\frac{1}{3}$

Range = $3\frac{2}{3}$

Area and Perimeter

A rectangle has a width of 3 cm and a height of 2 cm.

Draw a second rectangle so that the two rectangles have a mean area of 13 cm² and have perimeters with a range of 8 cm.

Standard Form

Find the median of the following:

$$3\times10^{-4},\ 4\times10^{-3},$$

$$5\times10^{-6},\ 6\times10^{-5}.$$

1.8×10^{-4}

Surds

Zoe found the square root of the mean of 12, 27 and 48.

She should have done:

$$\text{Mean} = \frac{\sqrt{12}+\sqrt{27}+\sqrt{48}}{3} = \frac{2\sqrt{3}+3\sqrt{3}+4\sqrt{3}}{3} = \frac{9\sqrt{3}}{3} = 3\sqrt{3}\ (=\sqrt{27})$$

Bounds

Find the upper and lower bounds for the median of the following numbers:

3.5 (rounded to one decimal place),

27 (to two significant figures),

30 (to the nearest ten).

$25 \leq \text{Median} < 27.5$

(the third number could also be the median)

Equations

Find the upper bound for the median angle in a quadrilateral. Is it possible to actually draw a quadrilateral with that median angle?

The upper bound is 120°, which would be achieved if the angles were 0°, 120°, 120°, and 120°.

But this quadrilateral is not itself possible due to the 0°.

Rounding with...

Fractions

Which of the following round to 0.3 to one decimal place:

$\frac{1}{3}$	$\frac{35}{99}$	$\frac{25}{99}$
$\frac{1}{4}$	$\frac{35}{100}$	$\frac{25}{100}$
$\frac{1}{5}$	$\frac{35}{101}$	$\frac{25}{101}$

Decimals

Which of the following round to 0.2 to one decimal place:

$$0.195 + 0.045$$
$$0.195 - 0.045$$
$$0.2 \times 1.25$$
$$0.2 \div 1.25$$

Standard Form

Which of the following round to 0.001 to one significant figure:

$$9.4\times10^{-4}$$
$$9.5\times10^{-3}$$
$$1.4\times10^{-3}$$
$$1.4\times10^{-2}$$

Surds

Which of the following round to 10 to one significant figure:

$\sqrt{26}$	$\sqrt{200}$	$\sqrt[3]{2000}$
$2\sqrt{21}$	$4\sqrt{14}$	$\sqrt[3]{3000}$
$3\sqrt{11}$	$3\sqrt{26}$	$\sqrt[3]{4000}$

Substitution

Which of the following round to 40 to the nearest 10 when:

$$a = 30,\ b = 4,\ c = -0.5$$

$a + b + 2c$	$a + b - 2c$
$a + 4b + 2c$	$a + 4b - 2c$

Equations

Which of the following have solutions that round to 8 to the nearest even number.

$5x = 35$	$4x = 35$
$5x + 1 = 35$	$5x - 1 = 35$

Fractions

Which of the following round to 0.3 to one decimal place:

$\frac{1}{3}$	$\frac{35}{99}$	$\frac{25}{99}$
$\frac{1}{4}$	$\frac{35}{100}$	$\frac{25}{100}$
$\frac{1}{5}$	$\frac{35}{101}$	$\frac{25}{101}$

Decimals

Which of the following round to 0.2 to one decimal place:

$0.195 + 0.045$
$0.195 - 0.045$
0.2×1.25
$0.2 \div 1.25$

Standard Form

Which of the following round to 0.001 to one significant figure:

9.4×10^{-4}
9.5×10^{-3}
1.4×10^{-3}
1.4×10^{-2}

Answers!

Surds

Which of the following round to 10 to one significant figure:

$\sqrt{26}$	$\sqrt{200}$	$\sqrt[3]{2000}$
$2\sqrt{21}$	$4\sqrt{14}$	$\sqrt[3]{3000}$
$3\sqrt{11}$	$3\sqrt{26}$	$\sqrt[3]{4000}$

Substitution

Which of the following round to 40 to the nearest 10 when:

$$a = 30, b = 4, c = -0.5$$

$a + b + 2c$	$a + b - 2c$
$a + 4b + 2c$	$a + 4b - 2c$

Equations

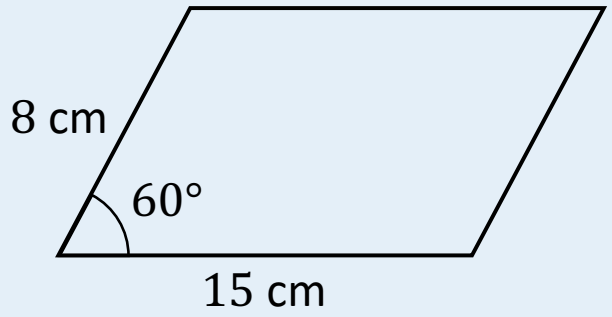
Which of the following have solutions that round to 8 to the nearest even number.

$5x = 35$	$4x = 35$
$5x + 1 = 35$	$5x - 1 = 35$

Trigonometry with...

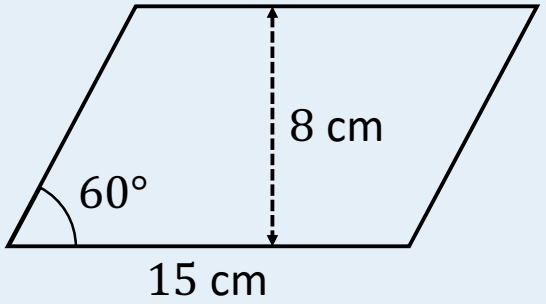
Area

Find the parallelogram's area.



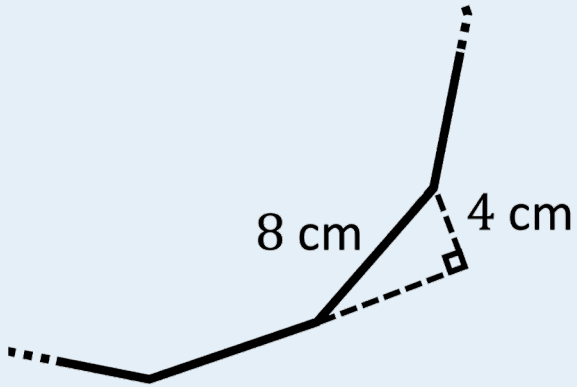
Perimeter

Find the parallelogram's perimeter.



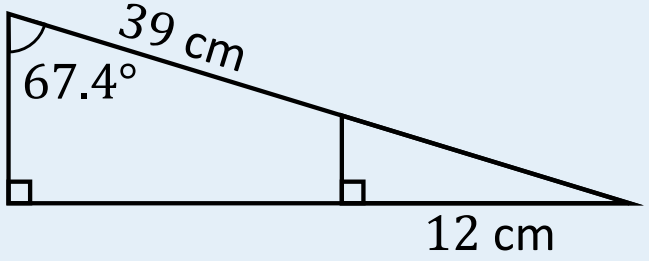
Angles in Polygons

How many sides does the regular polygon have?



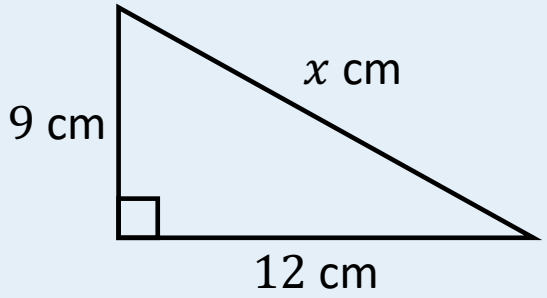
Similar Shapes

Find the area of the big triangle.



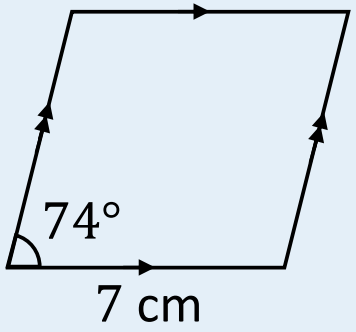
Pythagoras

Find x using two different methods.



Quadrilaterals

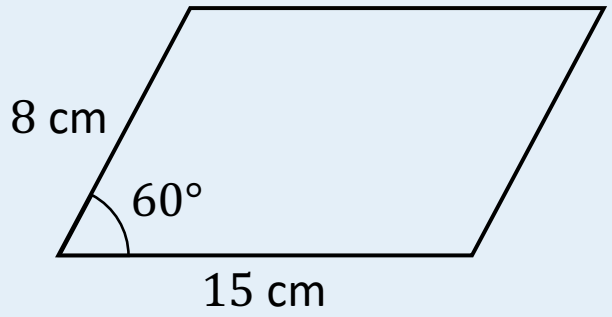
This shape has area 47.1 cm^2.
Show that it is a rhombus.



Answers!

Area

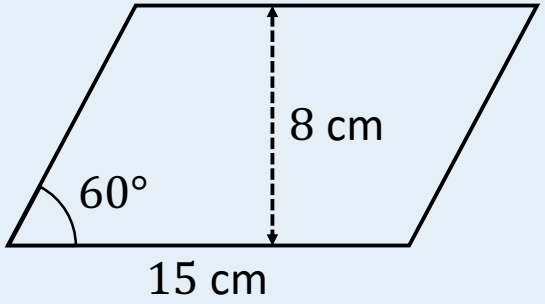
Find the parallelogram's area.



$103.9\ \text{cm}^2$ or $60\sqrt{3}\ \text{cm}^2$

Perimeter

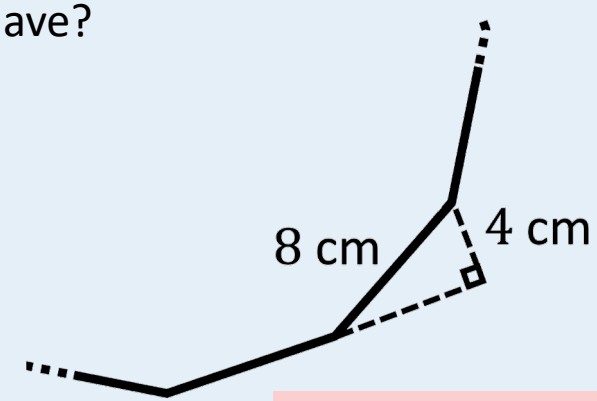
Find the parallelogram's perimeter.



48.5 cm

Angles in Polygons

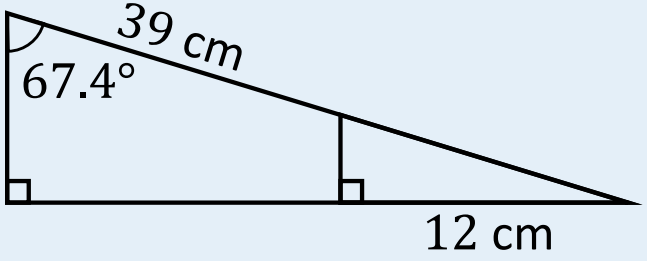
How many sides does the regular polygon have?



12 sides

Similar Shapes

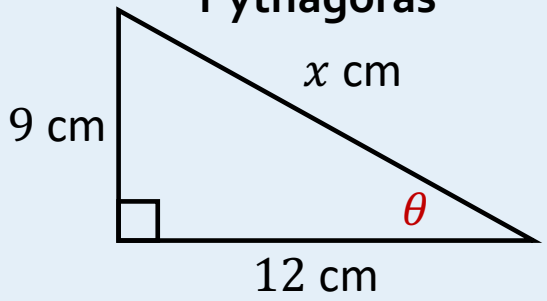
Find the area of the big triangle.



s.f. = 4

Area = $480\ \text{cm}^2$

Pythagoras



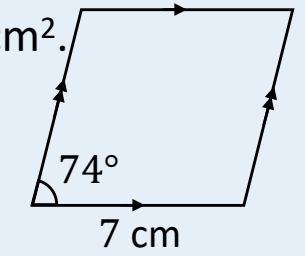
e.g. $\theta = \tan^{-1}\left(\frac{9}{12}\right) = 36.9°$

$x = \frac{9}{\sin(36.9)} = 15$ cm

(and using Pythagoras)

Quadrilaterals

This shape has area $47.1\ \text{cm}^2$.
Show that it is a rhombus.



$h = \frac{47.1}{7} = 6.73$ cm.

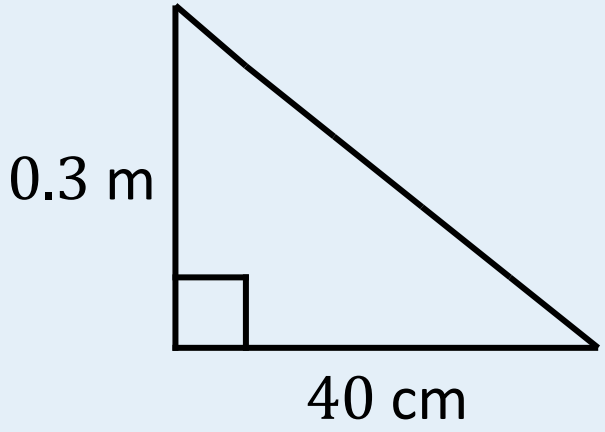
Left side $= \frac{6.73}{\sin(74)} = 7$ cm.

All four sides the same length, so it is a rhombus.

Pythagoras with...

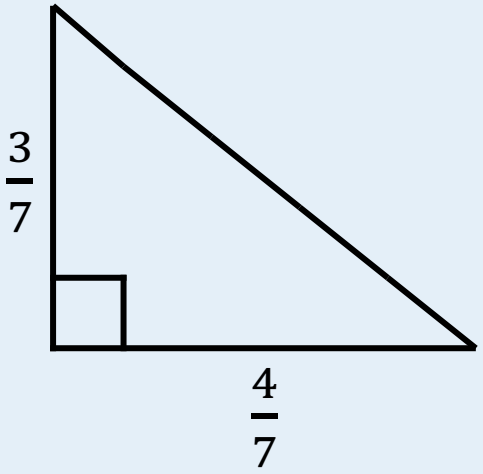
Unit Conversions

Find the hypotenuse.



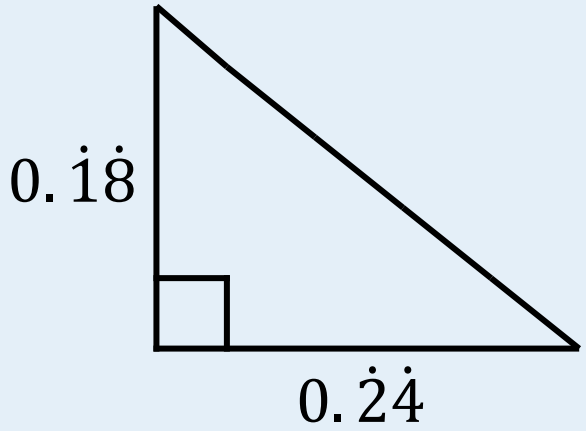
Fractions

Find the hypotenuse.



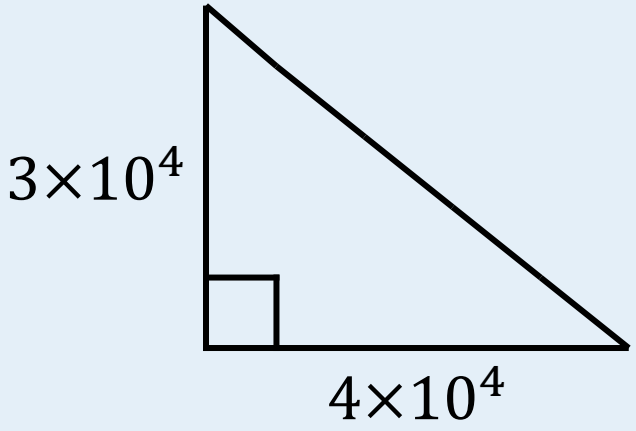
Recurring Decimals

Find the hypotenuse.



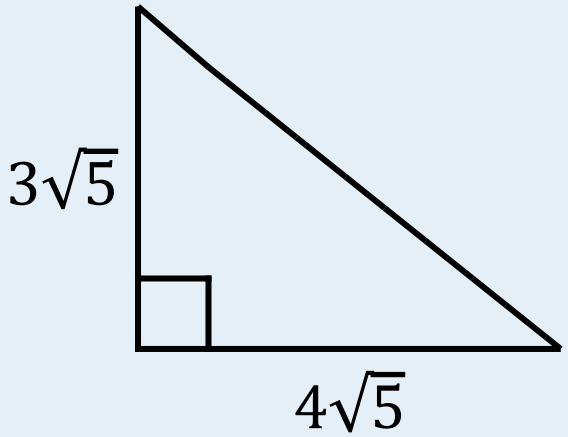
Standard Form

Find the hypotenuse.



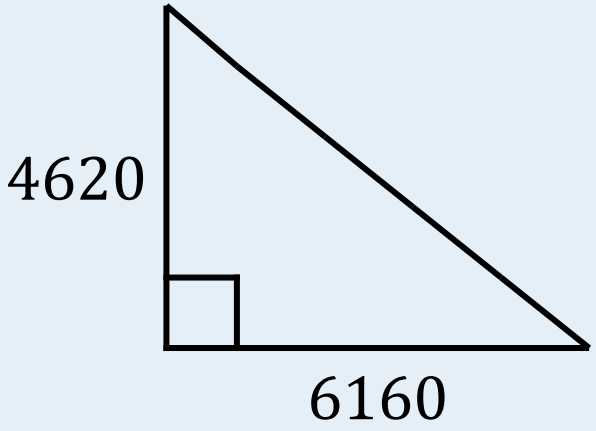
Surds

Find the hypotenuse.



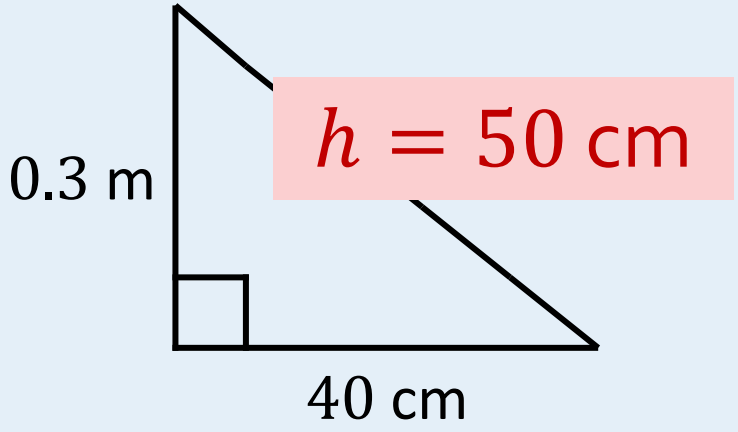
Prime Factorisation

Find the hypotenuse.



Unit Conversions

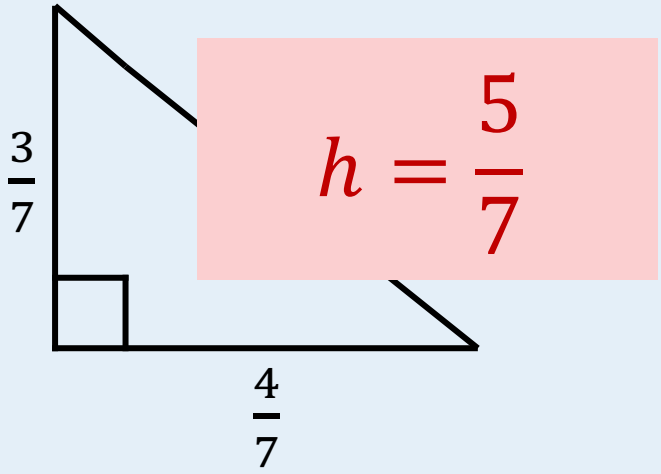
Find the hypotenuse.



$h = 50$ cm

Fractions

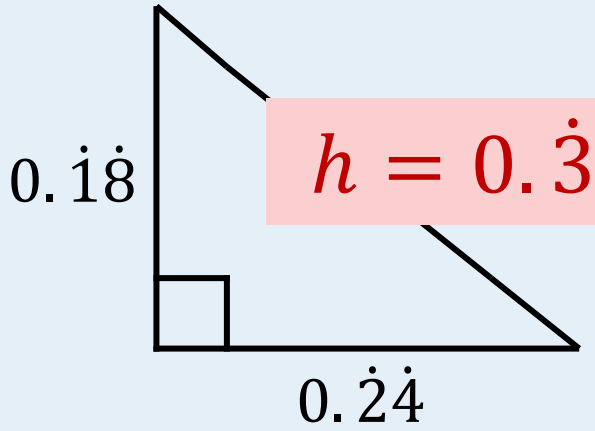
Find the hypotenuse.



$h = \frac{5}{7}$

Recurring Decimals

Find the hypotenuse.

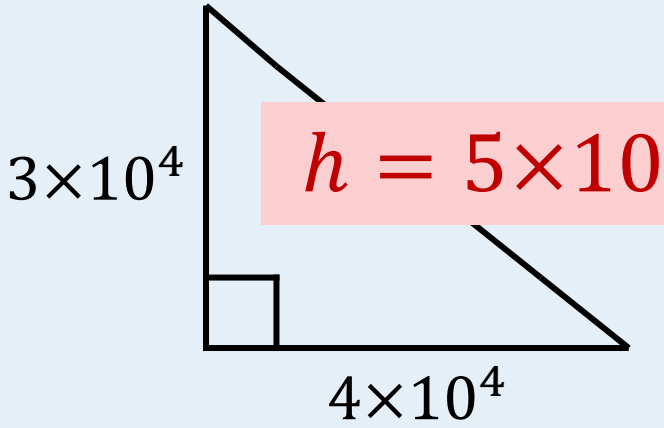


$h = 0.\dot{3}\dot{0}$

Answers!

Standard Form

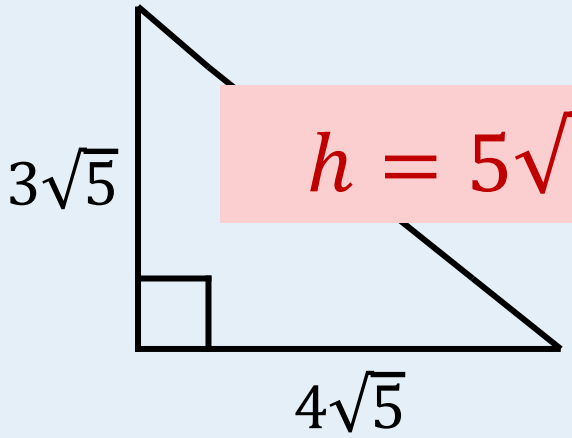
Find the hypotenuse.



$h = 5\times10^4$

Surds

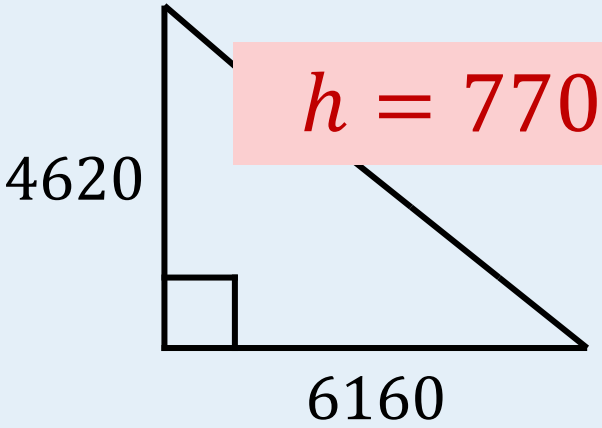
Find the hypotenuse.



$h = 5\sqrt{5}$

Prime Factorisation

Find the hypotenuse.



$h = 7700$

Angles in polygons with...

Ratio

A regular polygon has interior and exterior angles in the ratio

$5 : 1$

How many sides does it have?

Percentages

A regular polygon has exterior angles that are 2.5% of the size of the sum of its interior angles.

How many sides does it have?

Bounds

A regular polygon has interior angles that round to $150°$ to 2 significant figures.

How many sides could it have?

Simultaneous Equations

A regular polygon's interior angles are $120°$ bigger than its exterior angles.

How many sides does it have?

Averages

A polygon has one right angle. The mean of its other angles is $150°$.

How many sides does it have?

Sequences

A polygon has angles that form an arithmetic sequence.
Its smallest angle is $135°$ and its largest angle is $177°$.

How many sides does it have?

Answers!

Ratio

A regular polygon has interior and exterior angles in the ratio

$5 : 1$

How many sides does it have?

12 sides

Percentages

A regular polygon has exterior angles that are 2.5% of the size of the sum of its interior angles.

How many sides does it have?

10 sides

Bounds

A regular polygon has interior angles that round to $150°$ to 2 significant figures.

How many sides could it have?

11, 12, 13 or 14 sides

Simultaneous Equations

A regular polygon's interior angles are $120°$ bigger than its exterior angles.

How many sides does it have?

12 sides

Averages

A polygon has one right angle. The mean of its other angles is $150°$.

How many sides does it have?

14 sides

Sequences

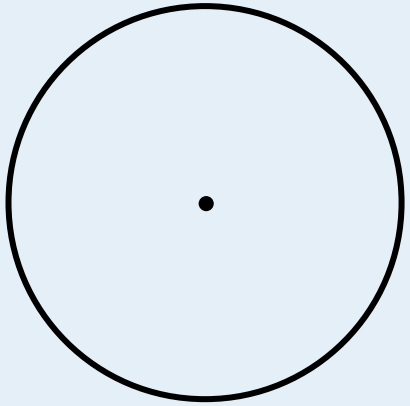
A polygon has angles that form an arithmetic sequence.
Its smallest angle is $135°$ and its largest angle is $177°$.

How many sides does it have?

15 sides

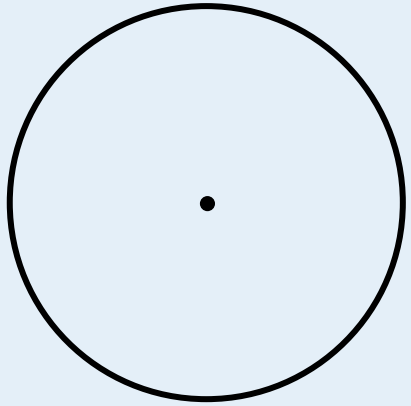
$A\hat{D}B = 20°$

What is $A\hat{C}B$?



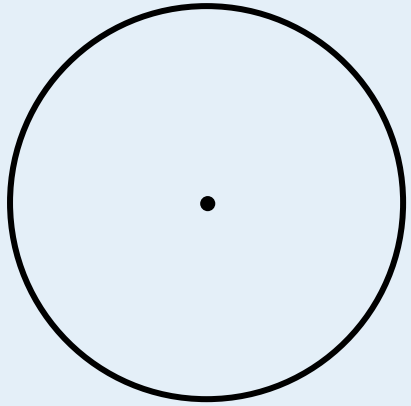
$A\hat{C}B = 20°$

What is $A\hat{B}C$?



$A\hat{D}B = 20°$

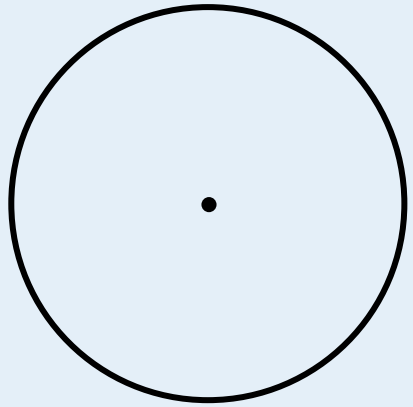
What is $A\hat{B}C$?



$A\hat{D}B = 20°$

What is $A\hat{E}B$?

(2 answers)

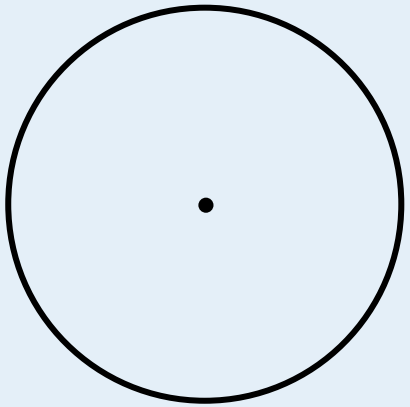


Circle Theorems with...

C is the centre of the circle, all other points are on the circumference.

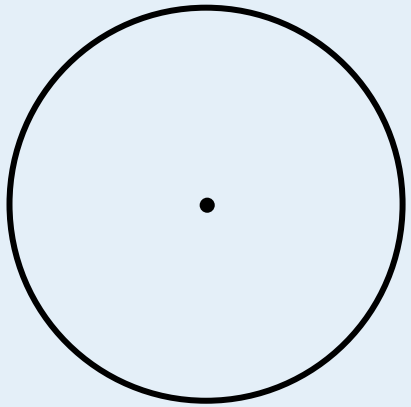
$A\hat{B}C = 20°$

What is $A\hat{C}B$?



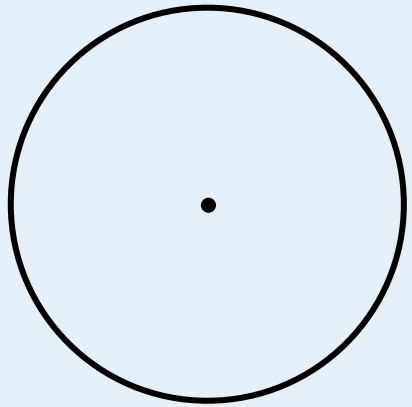
$A\hat{B}C = 20°$

What is $A\hat{D}B$?



$A\hat{D}B = 90°$

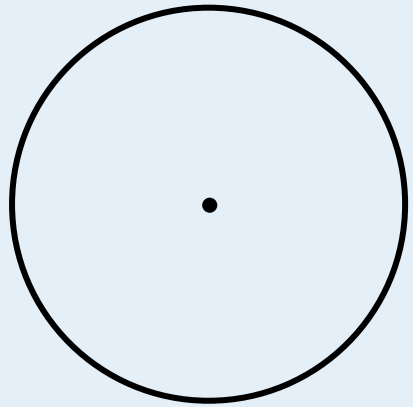
What is $A\hat{E}B$?



$A\hat{C}B = 20°$

What is $A\hat{D}B$?

(2 answers)



$A\hat{D}B = 20°$

What is $A\hat{C}B$?

40°

$A\hat{C}B = 20°$

What is $A\hat{B}C$?

80°

$A\hat{D}B = 20°$

What is $A\hat{B}C$?

70°

$A\hat{D}B = 20°$

What is $A\hat{E}B$?

(2 answers)

20° or 160°

Answers!

$A\hat{B}C = 20°$

What is $A\hat{C}B$?

140°

$A\hat{B}C = 20°$

What is $A\hat{D}B$?

70° or 110°

$A\hat{D}B = 90°$

What is $A\hat{E}B$?

90°

$A\hat{C}B = 20°$

What is $A\hat{D}B$?

(2 answers)

10° or 170°

Circle Theorems with...

C is the centre of the circle, all other points are on the circumference.

Ratio

$A\hat{D}B$ and $A\hat{E}B$ are in the ratio $2 : 7$.

What is $A\hat{D}B$?

Equations

$A\hat{B}C$ is $10°$ greater than $A\hat{D}B$.

What is $A\hat{B}C$?

Percentages

$A\hat{B}C$ is 25% of the size of $A\hat{C}B$.

What is $A\hat{B}C$?

Averages

The mean of $A\hat{C}B$ and $A\hat{D}B$ is $24°$.

What is $A\hat{D}B$?

Sequences

The angles of quadrilateral $ABDE$ form an arithmetic sequence.
The smallest angle is $45°$.
What is the second smallest angle?

Bounds

$A\hat{C}B$ is $30°$, to the nearest $10°$.

What is the range of possible values for $A\hat{D}B$?

Ratio

$A\hat{D}B$ and $A\hat{E}B$ are in the ratio $2 : 7$.

What is $A\hat{D}B$?

$40°$

Equations

$A\hat{B}C$ is $10°$ greater than $A\hat{D}B$.

What is $A\hat{B}C$?

$50°$

Percentages

$A\hat{B}C$ is 25% of the size of $A\hat{C}B$.

What is $A\hat{B}C$?

$30°$

Answers!

Averages

The mean of $A\hat{C}B$ and $A\hat{D}B$ is $24°$.

What is $A\hat{D}B$?

$16°$

Sequences

The angles of quadrilateral $ABDE$ form an arithmetic sequence.
The smallest angle is $45°$.
What is the second smallest angle?

$105°$

Bounds

$A\hat{C}B$ is $30°$, to the nearest $10°$.
What is the range of possible values for $A\hat{D}B$?

$12.5° \leq \theta < 17.5°$
or
$172.5 < \theta \leq 177.5$