For a rectangular shape such as a display screen, the longer side is called the width (W) and the shorter side is the height (H). The aspect ratio is W:H or W/H.

1. What is the approximate aspect ratio of the screen on your graphing calculator? Consider only the window, not the entire screen.

Answers will vary slightly.

The approximate aspect ratio of the TI- 83/84 graphing calculator screen is 4.7 : 3.1 or $\frac{4.7}{3.1}$

The size of a television is the length of the diagonal of its screen in inches. The aspect ratio of the screens of older televisions is 4:3, while the aspect ratio of newer wide-screen televisions is 16:9.

2. Find the width and height of an older 25-inch television whose screen has an aspect ratio of 4:3.

One way to solve this question is to use the Pythagorean Theorem:

$$A^{2 }+B^{2}= C^{2}$$



Let $W= 4x^{}$

Let $H= 3x^{}$

Using the Pythagorean Theorem:

**H**

$$A^{2} + B^{2}=C^{2}$$

$$4x^{2}+3x^{2}=25^{2}$$

**W**

So that, $W=\left(4\*5\right)=20 inches $

$$ H= (3\*5)=15 inches$$

$16x^{2}+9x^{2}=25^{2}$

Find the area of this screen.

$$Area=W ● H=20 ● 15=300 in^{2}$$

$$ 25x^{2}=625$$

$$ x^{2}=\frac{625}{25}$$

$$ \sqrt{x^{2}}=\sqrt{25}$$

$$ x=5 $$

3. Repeat this process to find the width and height of a newer 48-inch television whose screen has an aspect ratio of 16:9.

Let $W= 16x^{}$

Let $H= 9x^{}$

Using the Pythagorean Theorem:

$$ A^{2} + B^{2}=C^{2}$$

$$ 16x^{2}+9x^{2}=48^{2}$$

$$256x^{2}+81x^{2}=2,304$$

$$ 337x^{2}=2,304$$

$$ \sqrt{x^{2}}=\sqrt{\frac{2,304}{337}}$$

$$ x=10,46$$

So that, $W=\left(16\*2.6\right)≈42 inches $

$$ H= \left(9\*2.6\right) ≈24 inches$$

Determine the area of the screen of a newer 48-inch television whose screen has an aspect ratio of 16:9.

$$Area=W ● H=42 ● 24=984.5 in^{2}$$

When movies that were made in one aspect ratio are shown on televisions that have a different aspect ratio, black bars of equal width cover a portion of the screen. Portions of the screen are not needed to project images that were created with different aspect ratios.

 

Figure 1 Figure 2

4:3 screen displaying a 16:9 image 16:9 screen displaying a 4:3 image

4. Figure 1 shows a letterboxed image with an aspect ratio of 16:9 displayed on a screen with an aspect ratio of 4:3. What percent of the screen’s area is occupied by the image? Justify your answer.

The screen can be thought of as 16 units by 12 units.

The image can be thought of 16 units by 9 units.

Therefore, the percent of the screen occupied by the image is $ \frac{9}{12} or 75\%$

Some people do not like seeing the letterboxes when watching a 16:9 image on a 4:3 display, as shown in Figure 1. What would happen to the image if it filled the height of the TV?

If the image is stretched to fill the height of the display, the width must also be stretched by the same scale factor to not distort the image.

When the width is increased, a portion of the image will not be displayed on the screen.

Figure 2 shows a pillar boxed 4:3 image displayed on a 16:9 screen. What percent of the screen’s area is occupied by the image? Justify your answer.

The screen can be thought of as 16 units by 9 units.

The image can be thought of 12 units by 9 units.

Therefore, the percent of the screen occupied by the image is $ \frac{12}{16} or 75\%$

People who own a wide-screen television can choose one of three views of a 4:3 image on their display.

* The normal view shows the pillar boxes, as shown in Figure 2.
* Another option is to stretch the width of the image, keeping the height the same.
* A third option is to zoom in on the image, making the width of the image take the full width of the display.

What affect do these options have on the image?

The stretch option distorts the image and seems wider than intended.

The zoom option cuts of part of the top and bottom of the image.