1. If each small square measured 1 cm by 1 cm, what would be the total area and perimeter of the flag?

a) Area =

b) Perimeter =

2. a) Approximate the area of the orange strip of the flag.

b) What shape is the orange stripe?

c) Which other stripe has the same area as orange? How do you know?

3. a) Explain why the top length of the yellow strip is exactly $7\frac{1}{3}$ cm.

b) Calculate the area of yellow.

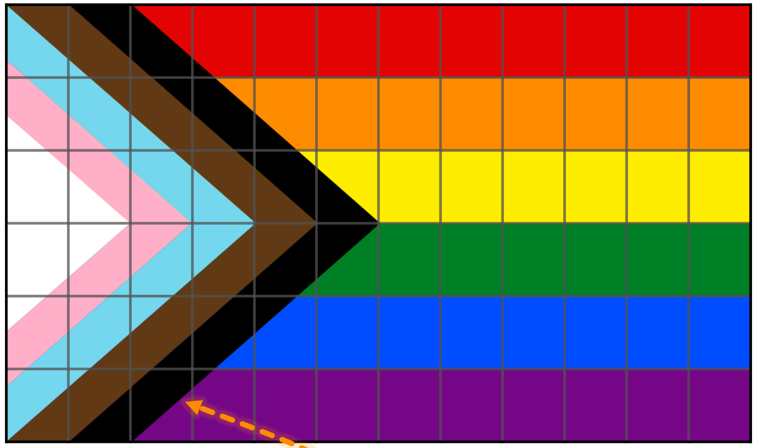
4. a) Use Pythagoras' Theorem to calculate the length of the diagonal side of the green strip.

b) Calculate the perimeter of green.

Background Information

Shown to the right is the '**Progress Pride Flag**' designed by Daniel Quasar in 2018.

It shows the traditional six colours of the rainbow pride flag used by LGBTQIA+ communities since the 1970s, with added triangular 'chevrons' representing additional groups such as transgender people and people of colour.



5. a) What are the gradients of the edges of the **black** chevron? Are any parallel? Perpendicular?

b) Calculate the length of each of those edges.

6. What percentage of the total area of the flag is **dark blue**?

7. If the origin was in the bottom-left corner of the flag, what would be the equation of the edge between **violet** and **black**?

8. a) What is the area of white?

b) What is the area of pink?

9. What fraction of the total area of the flag is light blue?

1. If each small square measured 1 cm by 1 cm, what would be the total area and perimeter of the flag?

a) Area = $6 \times 12 = 72 \text{ cm}^2$

b) Perimeter = $2(6 + 12) = 36 \text{ cm}$

2. a) Approximate the area of the orange strip of the flag.

~ 8 **boxes** $\rightarrow 8 \text{ cm}^2$

b) What shape is the orange stripe?

A trapezium

c) Which other stripe has the same area as orange? How do you know?

Dark blue, by symmetry

3. a) Explain why the top length of the yellow strip is <u>exactly</u> $7\frac{1}{3}$ cm.

Each time the black diagonal goes down 1, it goes right by $1\frac{1}{3}$.

b) Calculate the area of yellow.

$$\frac{1}{2} \times 1 \times \left(6 + 7\tfrac{1}{3}\right) = 6\tfrac{2}{3} \text{ cm}^2$$

4. a) Use Pythagoras' Theorem to calculate the length of the diagonal side of the green strip.

$$\sqrt{1^2 + \left(1\tfrac{1}{3}\right)^2} = 1\frac{2}{3} \text{ cm}$$

b) Calculate the perimeter of green.

$$6 + 1 + 7\tfrac{1}{3} + 1\tfrac{2}{3} = 16 \text{ cm}$$

<u>Solutions</u>

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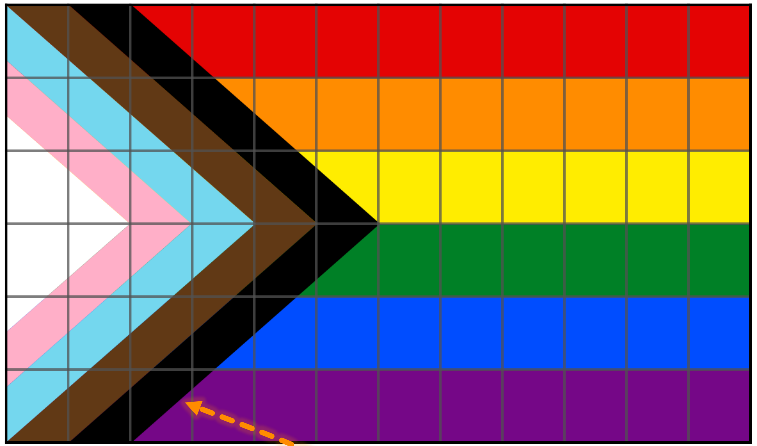

5. a) What are the gradients of the edges of the **black** chevron? Are any parallel? Perpendicular?

The gradients are $\frac{3}{4}$ and $-\frac{3}{4}$. So there are pairs of parallel edges, but not perpendicular edges.

b) Calculate the length of each of those edges.

$$\sqrt{3^2 + 4^2} = 5 \text{ cm}$$

6. What percentage of the total area of the flag is **dark blue**?

Area = $\frac{1}{2} \times 1 \times \left(8\tfrac{2}{3} + 7\tfrac{1}{3}\right) = 8 \text{ cm}^2$

So $\frac{8}{72} = 11.\dot{1}\%$ **of the flag is dark blue.**

7. If the origin was in the bottom-left corner of the flag, what would be the equation of the edge between **violet** and **black**?

$$y = \frac{3}{4}x - \frac{3}{2}$$

8. a) What is the area of white?

$$\frac{1}{2} \times 3 \times 2 = 3 \text{ cm}^2$$

b) What is the area of pink?

$$\frac{1}{2} \times 4\frac{1}{2} \times 3 - 3 = 3\frac{3}{4} \text{ cm}^2$$

9. What fraction of the total area of the flag is light blue?

Area = $\frac{1}{2} \times 6 \times 4 - 3\frac{1}{4} - 3 = 5\frac{1}{4} \text{ cm}^2$

So $\frac{5.25}{72} = \frac{7}{96}$ **of the flag is light blue.**

1. What is the colour of the region where each point is located?

a) $(2,4)$

b) $(5.5, 3.5)$

c) $(1.5, 4)$

d) $(3.4, 5.1)$

2. Which colours does each line pass through?

a) $y = x$

b) $x = 4$

c) $x + y = 7$

3. What is the colour of the region where each pair of lines meet?

a) $y = 2x - 2$ and $y = x + 1$

b) $y = 3x + 1$ and $y = 5 - x$

4. Find the coordinates of each point where three colours meet.

<u>**Background Information**</u>

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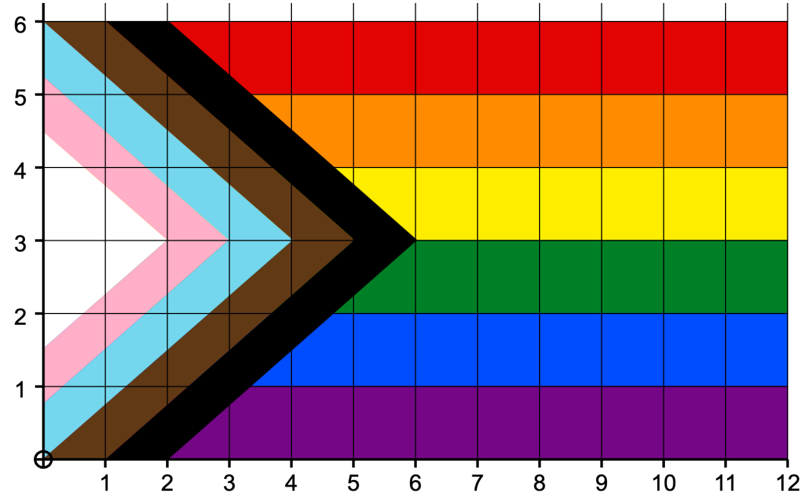
It shows the traditional six colours of the rainbow pride flag used by LGBTQIA+ communities since the 1970s, with added triangular 'chevrons' representing additional groups such as transgender people and people of colour.



5. a) What are the equations of the four lines that border the green stripe?

b) What four inequalities does the green stripe satisfy?

6. Find the coordinates of the point that divides the **yellow**/**green** border in the ratio $2 : 1$.

7. Explain using gradients why the white triangle is not right-angled.

8. Find the equation of the straight line connecting the top-left of the flag to the bottom-right of the flag.

9. Create and solve your own question using the Progress Pride Flag!

1. What is the colour of the region where each point is located?

a) $(2,4) \rightarrow$ Light Blue

b) $(5.5, 3.5) \rightarrow$ Yellow

c) $(1.5, 4) \rightarrow$ Pink

d) $(3.4, 5.1) \rightarrow$ **Red**

2. Which colours does each line pass through?

a) $y = x$
Light Blue, **Brown**, **Black**, Orange, **Red**

b) $x = 4$
Violet, **Blue**, **Black**, **Brown**, Orange, **Red**

c) $x + y = 7$
Brown, **Black**, **Green**, **Blue**, **Violet**

3. What is the colour of the region where each pair of lines meet?

a) $y = 2x - 2$ and $y = x + 1$

Brown – $(3, 4)$

b) $y = 3x + 1$ and $y = 5 - x$

Pink – $(1, 4)$

4. Find the coordinates of each point where three colours meet.

$\left(3\frac{1}{3}, 1\right)$ $\left(3\frac{1}{3}, 5\right)$

$\left(4\frac{2}{3}, 2\right)$ $\left(4\frac{2}{3}, 4\right)$

$(6, 3)$

Solutions

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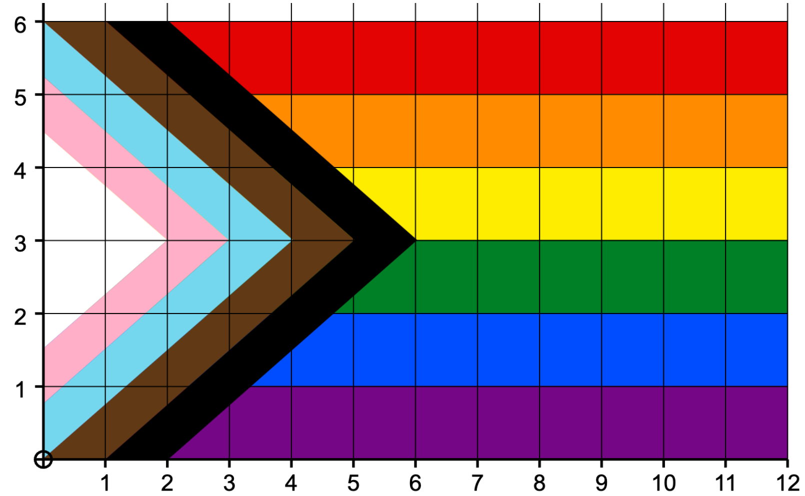

5. a) What are the equations of the four lines that border the green stripe?

$$y = 2, y = 3, x = 12, y = \frac{3}{4}x - \frac{3}{2}$$

b) What four inequalities does the green stripe satisfy?

$$y \geq 2, y \leq 3, x \leq 12, y \leq \frac{3}{4}x - \frac{3}{2}$$

6. Find the coordinates of the point that divides the yellow/**green** border in the ratio 2 : 1.

$$(10, 3)$$

7. Explain using gradients why the white triangle is not right-angled.

The gradients of the two non-vertical sides are $\frac{3}{4}$ and $-\frac{3}{4}$, which are not negative reciprocals of one another.

8. Find the equation of the straight line connecting the top-left of the flag to the bottom-right of the flag.

$$y = -\frac{1}{2}x + 6$$

9. Create and solve your own question using the Progress Pride Flag!