Which k Makes It Factor?

QE09-V1 · storyboard · QE09 Which k makes it factor?. Read each picture with its sentences.

Picture 1

Every k for which $x^2 + kx + 6$ factors with whole numbers.

$$6 = 1 \cdot 6 = 2 \cdot 3$$ the factor pairs of 6

$$(x+1)(x+6): \quad k = 7$$

$$(x+2)(x+3): \quad k = 5$$

$$(x-1)(x-6),\ (x-2)(x-3): \quad k = -7,\ -5$$

the negative twins

$$\boxed{k = \pm 5,\ \pm 7}$$

1. Find every k for which x squared, plus k x, plus 6, factors with whole numbers.
2. The factor pairs of 6 are 1 and 6, and 2 and 3.
3. x plus 1, times x plus 6, has the middle term 7 x: k is 7.
4. x plus 2, times x plus 3: k is 5.
5. Two negatives also multiply to 6: they give negative 7 and negative 5.
6. So there are four values: k equals plus or minus 5, or plus or minus 7.

Picture 2

The largest n for which $3x^2 + nx + 72$ factors with whole numbers.

$$(3x + 1)(x + 72)$$ the big numbers meet

$$\boxed{n = 3 \cdot 72 + 1 = 217}$$

7. Find the largest n for which 3 x squared, plus n x, plus 72, factors with whole numbers.
8. To make the middle term as big as possible, the big numbers must meet: 3 x meets 72, and 1 meets x.
9. So n is 3 times 72, plus 1, which is 217.

Picture 3

Trap $2x^2 + kx + 5$

$$\times \ (x + 1)(2x + 5) \text{ only}$$

$$\checkmark \quad (x + 1)(2x + 5), \quad (x + 5)(2x + 1)$$

10. Watch for the trap: don't try only one order.
11. x plus 1, times 2 x plus 5, gives k equals 7, but x plus 5, times 2 x plus 1, gives 11.
12. Try both orders.

Picture 4

Trap $x^2 + kx + 6$

$\times\ k = 5,\ 7$

$\checkmark\ \ k = \pm 5,\ \pm 7$

13. Another trap: don't forget the negative twins.
14. The answer is plus or minus 5, and plus or minus 7.