Topic: Age word problems

Question: 20 years ago, Beth's age was 6 years greater than twice Chris' age. 6 years ago, Chris was $3/5$ as old as Beth. How old are they now?

Answer choices:

A	Beth is 36	Chris is 20
B	Beth is 46	Chris is 30
C	Beth is 66	Chris is 50
D	Beth is 18	Chris is 12

Solution: B

If we say that Beth's current age is B and that Chris' current age is C, then their ages 20 years ago are given by $B - 20$ and $C - 20$. At that time, Beth's age was 6 years greater than twice Chris' age, so we have the following equation:

$$(B - 20) - 6 = 2(C - 20)$$

$$B - 20 - 6 = 2C - 40$$

$$B - 26 = 2C - 40$$

$$B - 2C = -14$$

Their ages 6 years ago will be given by $B - 6$ and $C - 6$. At that time, Chris was $3/5$ as old as Beth, so we have another equation:

$$\frac{3}{5}(B - 6) = C - 6$$

$$5\left[\frac{3}{5}(B - 6)\right] = 5(C - 6)$$

$$3(B - 6) = 5(C - 6)$$

$$3B - 18 = 5C - 30$$

$$3B - 5C = -12$$

So our system of equations is

$$B - 2C = -14$$

$$3B - 5C = -12$$

We'll use substitution to solve the system, by solving the first equation for B and then substituting the resulting expression for B in the second equation.

$$B - 2C = -14$$

$$B = 2C - 14$$

Now we'll plug this expression for B into the second equation, and then solve for C.

$$3B - 5C = -12$$

$$3(2C - 14) - 5C = -12$$

$$6C - 42 - 5C = -12$$

$$C = 30$$

We'll plug the value we found for C into the equation $B = 2C - 14$ (and then compute the value of B).

$$B = 2C - 14$$

$$B = 2(30) - 14$$

$$B = 60 - 14$$

$$B = 46$$

If we've done the problem correctly, then Beth is currently 46 and Chris is currently 30. Let's check these ages against the original statement.

20 years ago, Beth's age was 6 years greater than twice Chris' age.

20 years ago, Beth would have been $46 - 20 = 26$.

20 years ago, Chris would have been $30 - 20 = 10$.

$$26 - 6 = 2(10)$$

$$20 = 20$$

6 years ago, Chris was $3/5$ as old as Beth.

6 years ago, Beth would have been $46 - 6 = 40$.

6 years ago, Chris would have been $30 - 6 = 24$.

$$\frac{3}{5}(40) = 24$$

$$3(8) = 24$$

$$24 = 24$$

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Question: Jordan is 16 years older than Ryan. In 6 years, Jordan will be twice as old as Ryan. How old is Jordan now?

Answer choices:

A 26

B 24

C 18

D 10

Solution: A

Because Jordan is 16 years older than Ryan, we can write Equation I:

$$j = r + 16$$

6 years from now, Ryan's age will be $r + 6$ and Jordan's age will be $j + 6$. At that time, Jordan will be twice as old as Ryan, so we need to double Ryan's age at that time to get Jordan's age at that time. We write Equation II:

$$2(r + 6) = j + 6$$

This is a table that summarizes their ages and our equations:

	Ryan	Jordan	Equation
Now	r	j	(I) j=r+16
Future	r+6	j+6	(II) 2(r+6)=j+6

Substitute $r + 16$ for j in Equation II, and then solve for r.

$$2(r + 6) = j + 6$$

$$2(r + 6) = (r + 16) + 6$$

$$2r + 12 = r + 22$$

$$r = 10$$

Substitute the value we found for r into Equation I, and the compute the value of j.

$$j = r + 16$$

$$j = 10 + 16$$

$$j = 26$$

Jordan is now 26 years old.

Topic: Age word problems

Question: Claire is 8 years older than Max. 4 years ago, she was three times as old as Max. How old is Max now?

Answer choices:

A 4

B 8

C 12

D 16

Solution: B

Because Claire is 8 years older than Max, we can write Equation I as

$$c = m + 8$$

4 years ago, Claire's age was $c - 4$ and Max's age was $m - 4$. At that time, Claire was three times as old as Max, so we need to triple Max's age at that time to get Claire's age at that time. We can write Equation II:

$$3(m - 4) = c - 4$$

This table summarizes their ages and our equations:

	Claire	Max	Equation
Now	c	m	(I) c=m+8
Past	c-4	m-4	(II) 3(m-4)=c-4

To find Max's current age, substitute $m + 8$ for c in Equation II, and then solve for m.

$$3(m - 4) = c - 4$$

$$3(m - 4) = (m + 8) - 4$$

$$3m - 12 = m + 4$$

$$2m = 16$$

$$m = 8$$

Max is now 8 years old.