Exercise 6(D)

Solution:

From the question, we have
$n(n + 2) = 168$
$n^2 + 2n - 168 = 0$
$n^2 + 14n - 12n - 168 = 0$
$n(n + 14) - 12(n + 14) = 0$
$(n + 14)(n - 12) = 0$
$n = -14, 12$
Since, n cannot be negative.
Thus, $n = 12$

Solution:

According to the question,
$16t^2 + 4t = 420$
$4t^2 + t - 105 = 0$
$4t^2 - 20t + 21t - 105 = 0$
$4t(t - 5) + 21(t - 5) = 0$
$(4t + 21)(t - 5) = 0$
$t = -21/4$ or 5
As, time cannot be negative.
Therefore, the required time taken by the stone to fall 420 meter is 5 seconds.

Solution:

Let's assume the ten's and unit's digit of the required number to be x and y respectively.
Then, from the question we have
$x \times y = 24$
$y = 24/x$ …. (1)
Also,
$y = 2x + 2$
Using (1) in the above equation,
$24/x = 2x + 2$
$24 = 2x^2 + 2x$
$2x^2 + 2x - 24 = 0$
$x^2 + x - 12 = 0$ [Dividing by 2]
$(x + 4)(x - 3) = 0$

x = -4, 3
As the digit of a number cannot be negative, x = -4 is neglected
Thus, x = 3
So, y = 24/ 3 = 8
Therefore, the required number is 38.

Solution:

Given, the ages of two sisters are 11 years and 14 years.
Let x be the number of years later when their product of their ages become 304.
So, (11 + x) (14 + x) = 304
$154 + 11x + 14x + x^2 = 304$
$x^2 + 25x – 150 = 0$
(x + 30) (x - 5) = 0
x = -30, 5
As, the number of years cannot be negative. We only consider, x = 5.
Therefore, the required number of years is 5 years.

Solution:

Let’s consider the present age of the son to be x years.
So, the present age of the man = x^2 years
One year ago,
Son's age = (x - 1) years
Man's age = $(x^2 - 1)$ years
From the question, it’s given that one year ago; the man was 8 times as old as his son.
$(x^2 - 1) = 8(x - 1)$
$x^2 - 8x - 1 + 8 = 0$
$x^2 - 8x + 7 = 0$
(x - 7) (x - 1) = 0
x = 7, 1
When x = 1, then $x^2 = 1$, which is not possible as father's age cannot be equal to son's age.
Hence, x = 7 is taken
Therefore,
The present age of son = x years = 7 years
The present age of man = x^2 years = 49 years

1. Solution:

Let’s assume the present age of the son to be x years.

So, the present age of the father = $2x^2$ years
Eight years hence,
Son's age = (x + 8) years
Father's age = ($2x^2$ + 8) years
From the question, it's given that eight years hence, the age of the father will be 4 years more than three times the age of the son.
$2x^2 + 8 = 3(x + 8) + 4$
$2x^2 + 8 = 3x + 24 + 4$
$2x^2 - 3x - 20 = 0$
$2x^2 - 8x + 5x - 20 = 0$
$2x(x - 4) + 5(x - 4) = 0$
$(x - 4)(2x + 5) = 0$
$x = 4, -5/2$
As, age cannot be negative. x = 4 is considered.
Therefore,
The present age of the son = 4 years
The present age of the father = $2(4)^2$ years = 32 years