Scrap paper is available but write your final solution clearly in the space provided

Let the integers be represented by x and $(-31-x)$.

$$x(-31-x) = 240$$
$$-31x - x^2 = 240$$
$$x^2 + 31x + 240 = 0$$
$$(x+15)(x+16) = 0$$
$$x = -15,\ -16$$

If $x = -15$, the second integer is $(-31-x) = -31+15 = -16$.

If $x = -16$, the second integer is $(-31-x) = -31+16 = -15$.

[1] The two consecutive integers are –15 and –16.

a. When $t = 0$, $h = 5$. The ball is released at 5 cm.

b. $h = 5 + 50t - 5t^2$

$$= -5(t^2 - 10t + 25) + 5 + 125$$

$$= -5(t-5)^2 + 130$$

The maximum height is 130 m.

c. The ball hits the ground when $h = 0$.

$$5 + 50t - 5t^2 = 0$$
$$5t^2 - 50t - 5 = 0$$
$$t^2 - 10t - 1 = 0$$
$$t = \frac{10 \pm \sqrt{100+4}}{2}$$
$$= \frac{10 \pm \sqrt{104}}{2}$$
$$\doteq 10.099 \text{ or } -0.099$$

[2] Time cannot be a negative. The ball stays in the air for 10.1 s and Margarita's team can win a prize.

a. $3^{x^2+2x} = 27$

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

$x^2 + 2x = 3$

$x^2 + 2x - 3 = 0$

$(x+3)(x-1) = 0$

$x = -3, \ +1$

c. $\frac{1}{4}(2)^{x^2} = 2^x$

$2^{-2}(2)^{x^2} = 2^x$

$2^{x^2-2} = 2^x$

$x^2 - 2 = x$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x = 2, \ -1$

b. $2^{x^2} \times 2^{3x} = \frac{1}{4}$

$2^{x^2+3x} = 2^{-2}$

$x^2 + 3x = -2$

$x^2 + 3x + 2 = 0$

$(x+2)(x+1) = 0$

$x = -2, \ -1$

d. $3^x \times 81 = 3^{5-x^2}$

$3^x \times 3^4 = 3^{5-x^2}$

$3^{x+4} = 3^{5-x^2}$

$x + 4 = 5 - x^2$

$x^2 + x - 1 = 0$

$x = \frac{-1 \pm \sqrt{1+4}}{2}$

$= \frac{-1 \pm \sqrt{5}}{2}$

[3]

Let x represent the width of the frame.

$(90-2x)(120-2x) = 8800$

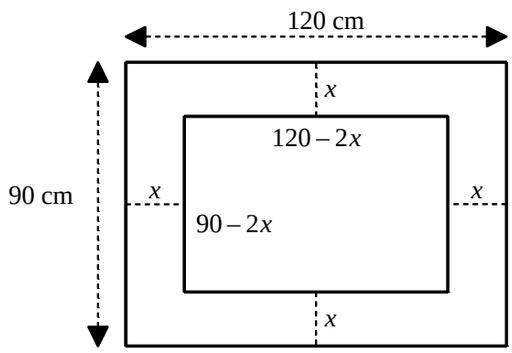
$10\ 800 - 180x - 240x + 4x^2 = 8800$

$4x^2 - 420x + 2000 = 0$

$x^2 - 105x + 500 = 0$

$(x-100)(x-5) = 0$

$x = 100, \ 5$



If $x = 100,$ the length and width of the mirror would be negative.

[4] Therefore, the width of the frame is 5 cm.

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a. $3^x + 6 = 87$

$3^x = 81$

$3^x = 3^4$

$x = 4$

c. $4^{x+1} - 22 = 42$

$4^{x+1} = 64$

$4^{x+1} = 4^3$

$x + 1 = 3$

$x = 2$

b. $5(2^x) - 160 = 0$

$2^x - 32 = 0$

$2^x = 2^5$

$x = 5$

d. $\frac{3^{x-1}}{6} = \frac{81}{2}$

$3^{x-1} = 243$

$3^{x-1} = 3^5$

$x - 1 = 5$

$x = 6$

[5]

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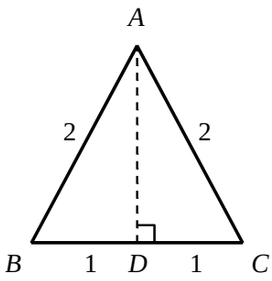
a.



b. $DC = 1$

c. $2^2 = AD^2 + 1^2$

$AD^2 = 3$

$AD = \sqrt{3}$

d. $\angle C = 60°$

e. $\angle DAC = 30°$

f. $\sin 30° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

g. $\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

$\tan 60° = \frac{\sqrt{3}}{1} = \sqrt{3}$

[6]

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a. $x^2 + 81 = 0$

$x^2 = -81$

$x = \pm\sqrt{-81}$

$= \pm 9i$

c. $x^2 + 15 = -12$

$x^2 = -27$

$x = \pm\sqrt{-27}$

$= \pm 3\sqrt{3}\,i$

b. $3(x-3)^2 = x^2 - 3$

$3(x^2 - 6x + 9) = x^2 - 3$

$3x^2 - 18x + 27 = x^2 - 3$

$2x^2 - 18x + 30 = 0$

$x^2 - 9x + 15 = 0$

$x = \frac{9 \pm \sqrt{21}}{2}$

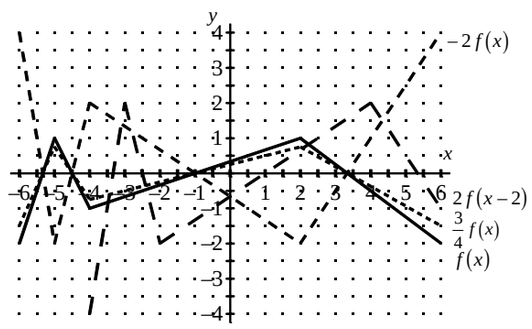
d. $(x+2)(x+5) = (x-4)^2$

$x^2 + 7x + 10 = x^2 - 8x + 16$

$15x = 6$

$x = \frac{2}{5}$

[7]



[8]
