Name: _____ Precalc 11

/23

Chapter 4 TEST

Calculator Part

Multiple Choice

A 1. The value of k that makes the expression $x^2 + 72x + k$ a perfect square trinomial is

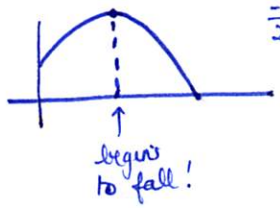
(A) 1296
B ~~144~~ 6
C 0
D ~~72~~ 5184

D 2. The roots, to the nearest hundredth, of $y = -\frac{1}{2}x^2 - 2x + \frac{7}{10}$ are

A –8.65 and 0.65
B 4.32 and –0.32
C –2.16 and 0.16
(D) –4.32 and 0.32

B 3. For a science experiment, a projectile is launched. Its path is given by $h(d) = -4.0d^2 + 61.3d + 20.9$, where h is the height of the projectile above the ground and d is the horizontal distance of the projectile from the launch pad, both in metres. How far away from the launch pad is the projectile when it begins to fall, to the nearest tenth of a metre?

A 255.8 m
(B) 7.7 m
C 20.9 ~~0.3~~ m
D 15.7 m



$\frac{-b}{2a} = \frac{-61.3}{-8}$

3

Short Answer

4. Use your graphing calculator to determine the roots of $y = -33.8x^2 + 6.8x + 13.4$ to the nearest hundredth.

$x \simeq -0.54$ $x \simeq 0.74$

1.5

5. Solve the quadratic equation $5x^2 + 20x - 6 = 0$. Circle your exact values and then round the roots to the nearest hundredth, if necessary.

$\Delta = 400 - 4 \times 5 \times (-6) = 520$

$$x = \frac{-20 \pm \sqrt{520}}{10} \quad \text{or} \quad -2 \pm \frac{1}{5}\sqrt{130}$$

2

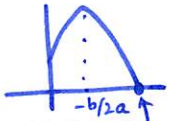
$x \simeq 0.28$ or $x \simeq -4.28$

Name: _____ **Precalc 11**

oblem

6. On a forward somersault dive, Nina's height, h, in metres, above the water is approximately modelled by the relation $h = -5t^2 + 7t + 4$, where t is the time in seconds after she leaves the board.

a) Find Nina's maximum height above the water. How long does it take her to reach the maximum height?



$\frac{-b}{2a} = \frac{-7}{-10} = 0.7$

$h(0.7) = 6.45$

0.7s
she reaches 6.45 m

1

b) How long is it before she enters the water?

2nd x-intercept

$\Delta = 49 - 4 \times (-5) \times 4 = 129$

$x = \frac{-7 \pm \sqrt{129}}{-10} \simeq 1.8$

1.8s

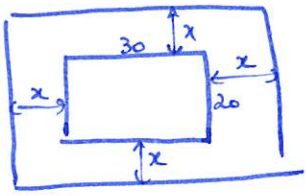
1

c) How high is the board above the water?

4m (y-intercept)

1

7. A uniform border on a framed photo has an area four times that of the photo. What are the outside dimensions of the border if the dimensions of the photo are 30 cm by 20 cm?



Total Area = Area of frame + Area of photo

$= 4 \times 600 + 600$

$= 3000$

$(30 + 2x)(20 + 2x) = 3000$

$600 + 60x + 40x + 4x^2 = 3000$

$4x^2 + 100x - 2400 = 0$

$4(x^2 + 25x - 600) = 0$

$4(x - 15)(x + 40) = 0$

$x = 15$ or ~~$x = -40$~~ no negative length.

$\Rightarrow$ dimensions: 50 cm by 60 cm

2.5

$x \approx 12.1$ with 2400 instead of 3000

$\Rightarrow$ 54.24 by 44.24

Name: _____ **Precalc 11**

.ON-Calculator Part

Multiple Choice

B **8.** Solve $(x+1)^2 = 43$.

A $1+\sqrt{43}$ and $1-\sqrt{43}$
B $-1+\sqrt{43}$ and $-1-\sqrt{43}$
C $\sqrt{43}-1$
D $\sqrt{42}$

1

Short Answer

9. For what values of k does the equation $x^2 - 7x + k = 0$ have

a) one real root?

$\Delta = 49 - 4\times 1\times k = 49 - 4k$

$\Delta = 0 \iff 4k = 49$ $\boxed{k = \frac{49}{4}}$

1.5

b) two distinct roots?

$\Delta > 0 \iff 49 - 4k > 0$

$4k < 49$ $\boxed{k < \frac{49}{4}}$

1

c) no real roots?

$\boxed{k > \frac{49}{4}}$

0.5

10. Factor the quadratic $(x^2-6)^2 + 7(x^2-6) - 30$ completely.

$(t = x^2 - 6)$

$= t^2 + 7t - 30$ $\otimes -30$, $\oplus 7$ → 10 & -3

$= (t+10)(t-3)$

$= (x^2-6+10)(x^2-6-3)$

$= (x^2+4)(x^2-9)$

2

$= (x^2+4)(x+3)(x-3)$

11. Solve the following equation by factoring: $2x^2 + 4x - 30 = 0$

$2(x^2+2x-15)=0$ $\quad \otimes -15 \mid \oplus 2 \;\Big\}\; 5 \& -3$

$2(x+5)(x-3)=0$

$x+5=0$ or $x-3=0$

$\boxed{x=-5}$ $\quad \boxed{x=3}$

2

12. Solve the following equation for x by completing the square $x^2 + 2x = k$

$x^2+2x-4=0$ $\quad$ vertex: $\frac{-b}{2a} = -1$ $\quad (-1;-5)$

$(x+1)^2-5=0$

$(x+1)^2=5$

$x+1=\pm\sqrt{5}$

$\boxed{x=-1\pm\sqrt{5}}$

2

13. The manager of a 80-unit apartment complex is trying to decide what rent to charge. At a rent of $200 per week, all the units will be full. For each increase in rent of $20 per week, one more unit will become vacant. Determine a quadratic equation that would solve his problem. Make sure you explain what your variable represents. Don't solve it.

x : # increases of \$20/week

$R(x)=(200+20x)(80-x)$

$=16000-200x+1600x-20x^2$

$=-20x^2+1400x+16000$

1.5