EXERCISE SET 2 ANSWER KEY

No Calculator

1. **14** $(x-2)(x+2)=0$
FOIL: $x^2-4=0$
Add 14: $x^2+10=14$

2. **6** $(a-3)(a+k)=a^2+3a-18$
FOIL: $a^2+(k-3)a-3k=a^2+3a-18$
Equate coefficients: $k-3=3;\ -3k=-18$
Therefore $k=6$.

3. **50** By the Factor Theorem, the parabola has x-intercepts at $x=-4$ and $x=-6$. The x-coordinate of the vertex is the average of these zeros, or -5. To get the y-coordinate of the vertex, we just plug $x=-5$ back into the equation: $y=10(-5+4)(-5+6)=10(-1)(1)=-10$. Therefore $a=-5$ and $b=-10$ and so $ab=50$.

4. **5** When $x=3$, $y=0$: $0=3(3)^2-k(3)-12$
Simplify: $0=27-3k-12$
Simplify: $0=15-3k$
Add $3k$: $3k=15$
Divide by 3: $k=5$

5. **1.8** The x-coordinate of the vertex is the average of the x-intercepts (if they exist): $(-1.2+4.8)/2=3.6/2=1.8$.

6. **18** The x-coordinate of the vertex is the average of the x-intercepts (if they exist):
$5=(b+4)/2$
Multiply by 2: $10=b+4$
Subtract 4: $6=b$
Substitute $x=5$ and $y=-3$ into equation to find the value of a: $-3=a(5-6)(5-4)=-a$
Multiply by -1: $3=a$
Therefore, $ab=(3)(6)=18$

7. **2.5** $0=2x^2-5x-12$
Factor: $0=(2x+3)(x-4)$
Therefore, the zeros are $x=-3/2$ and $x=4$, which have a sum of 2.5. Alternately, you can divide the original equation by 2:
$0=x^2-2.5x-12$
and recall that any quadratic in the form $x^2+bx+c=0$ must have zeros that have a sum of $-b$ and a product of c. Therefore, without having to calculate the zeros, we can see that they have a sum of $-(-2.5)=2.5$.

8. **2.4** We know that one of the zeros is $x=-5$, and we want to find the other, $x=b$. We can use the Factor Theorem:
$x^2-ax-12=(x+5)(x-b)$
FOIL: $x^2-ax-12=x^2+(5-b)x-5b$
Since the constant terms must be equal, $12=5b$ and therefore, $b=12/5=2.4$.

9. **C** $2a(a-5)+3a^2(a+1)$
Distribute: $2a^2-10a+3a^3+3a^2$
Collect like terms: $3a^3+5a^2-10a$

10. **A** Substitute $x=0$ to find the y-intercept of each graph. Only (A) and (B) yield negative y-intercepts, so (C) and (D) can be eliminated. Factoring the function in (A) yields $y=-(x+3)$, which has only a single x-intercept at $x=-3$.

11. **C** $2x^2+8x=42$
Divide by 2: $x^2+4x=21$
Subtract 21: $x^2+4x-21=0$
Factor: $(x+7)(x-3)=0$
Therefore, $x=-7$ or 3, but since $x<0$, $x=-7$ and therefore, $x^2=(-7)^2=49$.

12. **B** Draw a quick sketch of the parabola. Since it has a vertex at (4, 7), it must have an axis of symmetry of $x=4$. The two zeros of the function must be symmetric to the line $x=4$, and since the zero $x=2$ is two units to the left of the axis, the other must by 2 units to the right, at $x=6$.

Calculator

13. **5** $2x^2-4x=30$
Divide by 2: $x^2-2x=15$
Subtract 15: $x^2-2x-15=0$
Factor: $(x-5)(x+3)=0$
Therefore, $x=5$ or -3. But since $x>0$, $x=5$.

14. **6** Let's call the one solution a. If it is the only solution, the two factors must be the same:
$x^2+bx+9=(x-a)(x-a)$
FOIL: $x^2+bx+9=x^2-2ax+a^2$
Therefore, $b=-2a$ and $a^2=9$. This means that $x=3$ or -3 and so $b=-2(3)=-6$ or $-2(-3)=6$. Since b must be positive, $b=6$.

15. **73.6** The y-intercept is simply the value of the function when $x=0$: $y=5(0-3.2)(0-4.6)=73.6$.

16. **3.9** The x-coordinate of the vertex is simply the average of the zeros: $(3.2+4.6)/2=3.9$.

17. **7** $(2x-1)(x+3)+2x=2x^2+kx-3$
FOIL: $2x^2+5x-3+2x=2x^2+kx-3$
Simplify: $2x^2+7x-3=2x^2+kx-3$
Subtract $2x^2$ and add 3: $7x=kx$
Divide by x: $7=k$

18. **14** $b^2 + 20b = 96$

Subtract 96: $b^2 + 20b - 96 = 0$

Factor: $(b - 4)(b + 24) = 0$

Therefore, $b = 4$ or -24, but if $b > 0$, then b must equal 4, and therefore, $b + 10 = 14$. Alternately, you might notice that adding 100 to both sides of the original equation gives a "perfect square trinomial" on the left side: $b^2 + 20b + 100 = 196$

Factor: $(b + 10)^2 = 196$

Take square root: $b + 10 = \pm 14$

If $b > 0$: $b + 10 = 14$

19. **C** Since the vertex of the parabola is at (3, 7), the axis of symmetry is $x = 3$. Since $x = -1$ is 4 units to the left of this axis, and $x = 7$ is 4 units to the right of this axis, $f(-1)$ must equal $f(7)$.

20. **D** $y = -2(x - 1)(x - 5)$ has x-intercepts at $x = 1$ and $x = 5$ and a y-intercept of $y = -10$. (Notice that the function in (C) has only *one* positive x-intercept at $x = 5$.)

21. **D** This one is tough. Since this question allows a calculator, you could solve this by graphing or with the Quadratic Formula. Remember that a quadratic equation has no real solution if $b^2 - 4ac < 0$. The only choice for which $b^2 - 4ac$ is negative is (D). Alternately, if you graph the left side of each equation as a function in the xy-plane (which I only advise if you have a good graphing calculator), you will see that the function in (D) never crosses the x-axis, implying that it cannot equal 0.

22. **A** This quadratic has zeros at $x = -6$ and $x = -8$, so its axis of symmetry is at the midpoint of the zeros, at $x = -7$.

23. **C** If the vertex of the parabola is at (6, −1), its axis of symmetry must be $x = 6$. The y-intercept of the function is $f(0)$, which is the value of y when $x = 0$. Since this point is 6 units to the left of the axis of symmetry, its reflection over the axis of symmetry is 6 units to the rights of the axis, at $f(12)$.