EXERCISE SET 1 ANSWER KEY

No Calculator

1. **1**

$(1-(1-(1-2)))-(1-(1-(1-3)))$

Parentheses: $(1-(1-(-1)))-(1-(1-(-2)))$

Next parentheses: $(1-(2))-(1-(3))$

Next parentheses: $(-1)-(-2)$

Subtract: $-1+2=1$

2. **9/2 or 4.5**

$6x-14=40$

Add 14: $6x=54$

Divide by 6: $x=9$

Multiply by $\frac{1}{2}$: $\frac{1}{2}x=\frac{9}{2}$

3. **22** Let n be the least of these numbers. The sum of four consecutive even numbers is therefore $n+(n+2)+(n+4)+(n+6)=76$.

Simplify: $4n+12=76$

Subtract 12: $4n=64$

Divide by 4: $n=16$

Therefore the largest of these numbers is $16+6=22$.

4. **28**

$\frac{5}{2}x+3=7$

Multiply by 4: $10x+12=28$

5. **7/6 or 1.16 or 1.17**

$x-7=-5x$

Subtract x: $-7=-6x$

Divide by -6: $\frac{7}{6}=x$

6. **0**

$5d+12=24$

Subtract 24: $5d-12=0$

7. **5**

$\frac{2y^2}{5}=y^2$

Subtract y^2: $-\frac{3y^2}{5}=0$

Multiply by $-5/3$: $y^2=0$

Take square root: $y=0$

Add 5: $y+5=5$

8. **C** If $xy=36$ and x and y are integers, then x and y are both factors of 36. In order to minimize the value of $x-y$, we must find the greatest separation between x and y. The greatest separation between a factor pair is $1-36=-35$.

9. **A** We should regard this as a "conversion" problem from *m days* into a corresponding number of *dollars*.

$$m\text{ days}\times\frac{b\text{ screens}}{n\text{ days}}\times\frac{c\text{ dollars}}{1\text{ screen}}=\frac{bcm}{n}$$

10. **B** Original expression: $5x(2x\times 3)-5x^2$

Parentheses: $5x(6x)-5x^2$

Multiply: $30x^2-5x^2$

Subtract: $25x^2$

Remember: The Law of Distribution does *not* apply in the first step, because the grouped expression doesn't include addition or subtraction.

11. **D** The simplest approach is perhaps to choose simple values for x and y, like 2 and 3, and see which operator yields a true equation. Since $(2\div 3)\times(3\div 2)=1$, the answer is (D).

Calculator

12. **45**

$a-b=4$

$a+b=14$

Add equations: $2a=18$

Divide by 2: $a=9$

Substitute $a=9$: $9+b=14$

Subtract 9: $b=5$

Evaluate ab: $ab=9\times 5=45$

13. **1**

$x+y-1=1-(1-x)$

Distribute: $x+y-1=1-1+x$

Subtract x: $y-1=1-1$

Simplify: $y-1=0$

Add 1: $y=1$

14. **200**

$3x^2+2x=40$

Multiply by 5: $15x^2+10x=200$

15. **12** Let e = Ellen's current age and m = Maria's current age.

Ellen is twice as old as Maria: $e=2m$

In 6 years, Maria will be 2/3 as old as Ellen: $m+6=\frac{2}{3}(e+6)$

Substitute $e=2m$: $m+6=\frac{2}{3}(2m+6)$

Multiply by 3: $3m+18=2(2m+6)$

Distribute: $3m+18=4m+12$

Subtract $3m$ and 12: $6=m$

Therefore $e=2m=2(6)=12$.

16. **15** First equation: $2x - 2y = 5$

Divide by 2: $x - y = 2.5$

Second equation: $x + y = 6$

Multiply: $(x - y)(x + y) = x^2 - y^2 = (2.5)(6) = 15$

Alternately, we could solve the system using either substitution or linear combination and get $x = 4.25$ and $y = 1.75$, and evaluate $x^2 - y^2 = (4.25)^2 - (1.75)^2 = 18.0625 - 3.0625 = 15$.

17. **B** The revenue is equal to the number of items sold times the price per item. If the restaurant typically sells n sandwiches per day, but today sold 50% more, it sold $1.5n$ sandwiches. If the price p was reduced 30%, today's price is $0.70p$. Therefore, the total revenue is $(1.5n)(0.70p) = 1.05np$.

18. **B** $4x(x) - 3xy(2x)$

Multiply: $4x^2 - 6x^2y$

Largest common factor: $2x^2(2 - 3y)$

19. **D** Although a calculator is permitted for this question, most calculators will give an "overflow error" when trying to calculate numbers like 99^{100}, because they're just too large. However, comparing these numbers is straightforward if we can express them in a common format.

$a = 60(99)^{99} + 30(99)^{99} = 90(99)^{99}$

$b = 99^{100} = 99(99)^{99}$

$c = 90(90)^{99} = 90(90)^{99}$

20. **A** Only statement I is true, by the Commutative and Associative Laws of Addition. Choosing simple values like $x = 1$, $y = 2$, and $z = 3$ will demonstrate that statements II and III do not yield true equations.

21. **C** Let x = the number of dollars David had to start. If Carlos started with twice as much money as David, then Carlos started with $2x$ dollars. After Carlos gave David \$12, Carlos had $2x - 12$ dollars and David had $x + 12$ dollars. If Carlos still had \$10 more than David, then

$2x - 12 = 10 + x + 12$

Simplify: $2x - 12 = x + 22$

Add 12: $2x = x + 34$

Subtract x: $x = 34$

Therefore, David started with \$34 and Carlos started with $2(\$34) = \$68$, so they had $\$34 + \$68 = \$102$ combined to start.