# ACT COMPASS Review Packet Contents: Pre-Algebra



## Tips and Formulas

- ***Know how to use the following functions for your calculator prior to testing.***
  - *Fraction button –* $a\frac{b}{c}$ *and* $2nd\frac{a}{b}$
  - *Scientific notation button –* $EXP$ *or* $EE$
  - *Exponent button –* $y^x$ *or* ^
  - *Square root button* $-\sqrt{\ }$

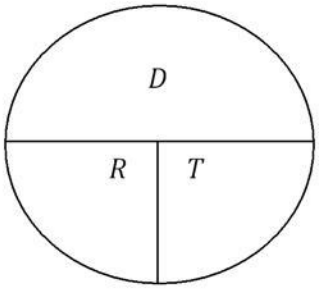
- ***The following problems can be solved on a calculator; practice and check your answers below.***
  - **1)** $\frac{1}{4}+\frac{1}{8}=?$
  - **2)** $(4\times10^{-3})+(4)+(5\times10^{-2})+(4\times10^{-1})=?$
  - **3)** $26^2+10^4=?$
  - **4)** $\sqrt{1200}$ *is closes to what whole number?*
  - **5)** $-5+\frac{3}{6(2)}-2=?$
  - ***Answers*:** **1)** $\frac{3}{8}$; **2)** 4.454; **3)** 10,676; **4)** 35; **5)** $-6\frac{3}{4}$
  - *Remember that when entering* $\frac{3}{6(2)}$ *into a calculator, use* $3\div(6\times2)$
    - *Do not use* $3\div6\div2$
    - *Or* $3\div6\times2$

- ***Know that all of the following indicate multiplication, a times b.***
  - $a\times b$
  - $a\cdot b$
  - $a*b$
  - $(a)(b)$
  - $a(b)$
  - $(a)b$

- ***Know how to take an average.***

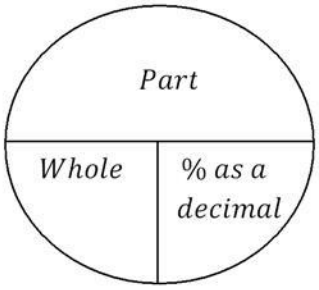
- ***Know that if you are asked how many times more is B than A, you must divide B by A.***

- ***Know that Distance = Rate × Time***
  - *Cover what you are looking for. If the remaining items are next to each other, then multiply. If one remaining item is on top of another, divide the top by the bottom.*
  - $D = R \cdot T$
  - $R = \frac{D}{T}$
  - $T = \frac{D}{R}$



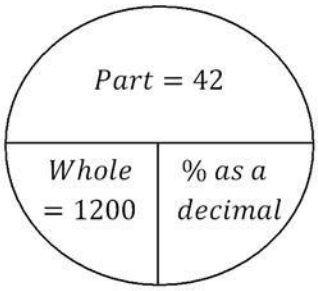

- ***Know ratio and proportion.***
  - *Units on top of each fraction (numerator)must be the same; units on the bottom (denominator)must also be the same.*
  - *The variable is always solved by cross multiplication; see example below.*
  - $\frac{x}{5} = \frac{12}{7}$ $\quad 7x = (12)(5) \quad$ $x = \frac{(12)(5)}{7}$

- ***Know how to determine percents.***
  - *Cover what you are looking for.*
  - *Always change a % into a decimal by moving the decimal point 2 places to the left.*
  - *Example*: $6.25\% = .0625$
  - $Percent = \frac{Part}{Whole} \times 100$



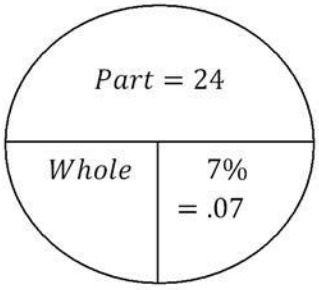

  - **1**) *What percent of* 1200 *is* 42?

    $\frac{42}{1200} \times 100 = 3.5\%$

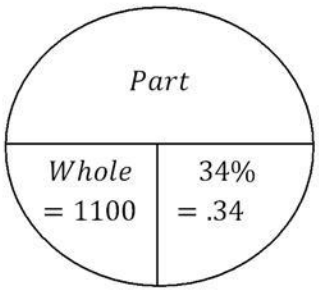



  - **2**) 24 *is what* 7% *of what? Round answer to two decimal places.*

    $\frac{24}{.07} = 342.86$



- **3**) $What\ is\ 34\%\ of\ 1100?$
  $(1100)(.34) = 374$




- $\%\ increase\ or\ decrease = \frac{amount\ of\ increase\ (or\ decrease)}{original\ amount} \times 100$

- ***Know how to calculate simple interest.***
  - $Interest = (principal)(rate\ as\ a\ decimal)(time\ in\ years)$
  - $I = Prt$

- ***Know how to work with absolute value signs.***
  - $|\quad| = absolute\ value\ signs$
  - $Perform\ the\ operations\ inside\ of\ them\ just\ like\ you\ would\ if\ they\ were\ parenthesis.\ Then\ if\ the\ number\ inside\ is\ negative, make\ it\ positive.$

## Sample Problems

1. $|7-2| - |2-7| = ?$
   a. 5
   b. 10
   c. $-5$
   d. 0
   e. $-10$

2. $If\ it\ takes\ 1\frac{3}{4}\ cups\ of\ flour\ to\ make\ a\ recipe, how\ much\ would\ be\ needed\ for \frac{1}{3} of\ the\ recipe?$
   a. $1\frac{3}{4} + \frac{1}{3}$
   b. $1\frac{3}{4} \times \frac{1}{3}$
   c. $1\frac{3}{4} \div \frac{1}{3}$
   d. $1\frac{3}{4} \times \frac{3}{1}$
   e. $1\frac{3}{4} - \frac{1}{3}$

3. *By how much does* $\frac{2}{3}$ *of* 15 *exceed* $\frac{2}{7}$ *of* 6?
    a. $8\frac{2}{7}$
    b. $11\frac{5}{7}$
    c. $6\frac{5}{7}$
    d. 4
    e. $-4\frac{1}{7}$

4. *What is* $\frac{1}{5}$ *of* 1 *hour and* 27 *minutes*?
    a. $17\frac{2}{5}$ *minutes*
    b. 17 *minutes*
    c. 16 *minutes*
    d. $16\frac{2}{5}$ *minutes*
    e. 18 *minutes*

5. *If you received a* 65% *and* 76% *on your first two tests, what must you receive on your third to maintain a* 70% *average*?
    a. 70%
    b. 80%
    c. 75%
    d. 68%
    e. 69%

6. *The average of* 5 *numbers is* 12. *If you remove the lowest number, the average becomes* 13. *What is the lowest number*?
    a. 4
    b. 6
    c. 8
    d. 10
    e. 12

7. *If you drive* 45 *miles per hour for* 90 *miles, then* 50 *miles per hour for* 50 *miles, and* 72 *miles per hour for* 72 *miles, what is your average speed*?
    a. 50 *miles per hour*
    b. 51 *miles per hour*
    c. 52 *miles per hour*
    d. 53 *miles per hour*
    e. 54 *miles per hour*

8. *You have to drive* 300 *miles. For the first three hours, you drive* 50 *miles per hour. How much longer will you have to drive if you increase your speed to* 65 *miles per hour*?
    a. $2\frac{4}{13}$ *hours*
    b. $2\frac{1}{2}$ *hours*
    c. 3 *hours*
    d. $3\frac{1}{13}$ *hours*
    e. 2 *hours*

9. *If you travel* 6 *hours at* 50 *miles per hour, and then* 3 *hours at* 75 *miles per hour, what was your average speed*?
    a. $62\frac{1}{2}$ *miles per hour*
    b. $57\frac{1}{4}$ *miles per hour*
    c. 60 *miles per hour*
    d. 55 *miles per hour*
    e. $58\frac{1}{3}$ *miles per hour*

10. *A recipe uses* $2\frac{1}{2}$ *cups of flour for each cup of milk; how many cups of flour must be used with* $1\frac{1}{2}$ *cups of milk*?
    a. 3 *cups*
    b. $3\frac{1}{2}$ *cups*
    c. $3\frac{3}{4}$ *cups*
    d. $3\frac{7}{8}$ *cups*
    e. 4 *cups*

11. *If you have* 30 *gallons of fuel that is* 4 *parts gasoline to* 1 *part alcohol, how many gallons of alcohol does your fuel contain*?
    a. 5 *gallons*
    b. 6 *gallons*
    c. 7 *gallons*
    d. 24 *gallons*
    e. 25 *gallons*

12. 3 *is what percent of* 4.0?
    a. 75%
    b. 70%
    c. 60%
    d. 65%
    e. 55%

13. *If you need* 40 *pens and a case contains* 500 *pens, what percent of* 40 *does the box contain*?
    a. 8%
    b. 12.5%
    c. 125%
    d. 1250%
    e. 2000%

14. *If you own* 8 *acres of land and* $\frac{1}{2}$ *of an acre of this land is swamp, what percent of your land is swampland*?
    a. 5%
    b. 6.25%
    c. 5.5%
    d. 20%
    e. 25%

15. *In September, a shirt is originally priced at* \$30.00; *in October, it is then reduced by* 25%. *In November, the price of the shirt is increased by* 25%. *What is the price of this shirt in November*?
    a. \$30.00
    b. \$31.00
    c. \$29.95
    d. \$27.50
    e. \$28.12

16. *In problem* 15, *what was the amount of the price increase in November*? *HINT*: *Pay attention to what the question is asking.*
    a. \$7.50
    b. \$37.50
    c. \$5.62
    d. \$8.24
    e. \$28.12

17. *On a* 40 *question test, you answered* 60% *of the* 35 *algebra questions correctly, and* 80% *of the* 5 *prealgebra problems correctly. What percent of the* 40 *total questions did you answer correctly*?
    a. 60%
    b. 70%
    c. 55%
    d. 62.5%
    e. 64.75%

18. *If* $\frac{3}{8}$ *of the* 32 *students in your class received an A, and* $\frac{1}{2}$ *of the rest received a B or C, then how many received a D or lower?*
    a. 6
    b. 9
    c. 10
    d. 12
    e. 13

19. *In* 2006, *the population of Joliet was* 80,000; *in* 2007, *it was* 82,000. *What percent did the population increase from* 2006 *to* 2007?
    a. 2%
    b. 2.5%
    c. 3%
    d. 2.44%
    e. 2.72%

20. *How much money would you have if you put* $5,000.00 *in the bank for* 6 *months at a* 6.25% *interest rate?*
    a. $156.25
    b. $200.00
    c. $550.00
    d. $5,100.00
    e. $5,156.25

21. *A box of rocks weighs* 100 *pounds. If half the rocks are removed, the box weighs* 51 *pounds. How much does the box weigh empty?*
    a. 1 *pound*
    b. 2 *pounds*
    c. 3 *pounds*
    d. 4 *pounds*
    e. ½ *pounds*

## Answers

| | | | | | |
|---|---|---|---|---|---|
| **1.** | D | **2.** | B | **3.** | A |
| **4.** | A | **5.** | E | **6.** | C |
| **7.** | D | **8.** | A | **9.** | E |
| **10.** | C | **11.** | B | **12.** | A |
| **13.** | D | **14.** | B | **15.** | E |
| **16.** | C | **17.** | D | **18.** | C |
| **19.** | B | **20.** | E | **21.** | B |

## Solutions

1. $|7-2|-|2-7|=?$

   a. 5
   b. 10
   c. $-5$
   d. **0**
   e. $-10$

   *Perform the operations inside the absolute value signs just like you would if they were parenthesis, then make negative numbers positive.*

   $|7-2|-|2-7| = |5|-|-5| = 5-5 = \mathbf{0}$

2. *If it takes* $1\frac{3}{4}$ *cups of flour to make a recipe, how much would be needed for* $\frac{1}{3}$ *of the recipe?*

   a. $1\frac{3}{4}+\frac{1}{3}$
   **b.** $\mathbf{1\frac{3}{4}\times\frac{1}{3}}$
   c. $1\frac{3}{4}\div\frac{1}{3}$
   d. $1\frac{3}{4}\times\frac{3}{1}$
   e. $1\frac{3}{4}-\frac{1}{3}$

   $\frac{1}{3}\ of\ 1\frac{3}{4} = \mathbf{1\frac{3}{4}\times\frac{1}{3}}$

3. *By how much does* $\frac{2}{3}$ *of* 15 *exceed* $\frac{2}{7}$ *of* 6?

   **a.** $\mathbf{8\frac{2}{7}}$
   b. $11\frac{5}{7}$
   c. $6\frac{5}{7}$
   d. 4
   e. $-4\frac{1}{7}$

   $\frac{2}{3}\times 15 = \frac{(2)(15)}{3} = \frac{30}{3} = 10$

   $\frac{2}{7}\times 6 = \frac{(2)(6)}{7} = \frac{12}{7}$

   $10-\frac{12}{7} = \frac{70}{7}-\frac{12}{7} = \frac{58}{7} = \mathbf{8\frac{2}{7}}$

4. *What is* $\frac{1}{5}$ *of 1 hour and 27 minutes?*

   **a.** $\mathbf{17\frac{2}{5}}$ ***minutes***
   b. 17 *minutes*
   c. 16 *minutes*
   d. $16\frac{2}{5}$ *minutes*
   e. 18 *minutes*

   $1\ hour + 27\ minutes = 87\ minutes$

   $\frac{1}{5}\times 87 = \frac{87}{5} = \mathbf{17\frac{2}{5}}$ ***minutes***

5. *If you received a* 65% *and* 76% *on your first two tests, what must you receive on your third to maintain a* 70% *average?*

   a. 70%
   b. 80%
   c. 75%
   d. 68%
   e. **69**%

   $\frac{65+76+x}{3} = 70$ $\qquad 65+76+x = 210$

   $141+x = 210$ $\qquad x = 210-141$

   $x = \mathbf{69}\%$

6. *The average of* 5 *numbers is* 12. *If you remove the lowest number, the average becomes* 13. *What is the lowest number?*

   a. 4
   b. 6
   c. **8**
   d. 10
   e. 12

$\frac{a+b+c+d+e}{5} = 12 \qquad a+b+c+d+e = 60$

*Assume that a is the smallest and remove it.*

$\frac{b+c+d+e}{4} = 13 \qquad b+c+d+e = 52$

$Therefore\ a + 52 = 60 \qquad a = \mathbf{8}$

7. *If you drive* 45 *miles per hour for* 90 *miles, then* 50 *miles per hour for* 50 *miles, and* 72 *miles per hour for* 72 *miles, what is your average speed?*

   a. 50 *miles per hour*
   b. 51 *miles per hour*
   c. 52 *miles per hour*
   d. **53 *miles per hour***
   e. 54 *miles per hour*

$Average\ speed = \frac{total\ number\ of\ miles}{total\ number\ of\ hours}$

$45\ mph\ for\ 90\ miles$

$Time = \frac{Distance}{Rate} \qquad x = \frac{90\ miles}{45\ mph} = 2\ hours$

$50\ mph\ for\ 50\ miles$

$Time = \frac{Distance}{Rate} \qquad x = \frac{50\ miles}{50\ mph} = 1\ hour$

$72\ mph\ for\ 72\ miles$

$Time = \frac{Distance}{Rate} \qquad x = \frac{72\ miles}{72\ mph} = 1\ hour$

$Total\ distance = 90 + 50 + 72 = 212\ miles$

$Total\ time = 2 + 1 + 1 = 4\ hours$

$Average\ speed = \frac{90+50+72}{45+50+72} = \frac{212}{4} = \mathbf{53\ mph}$

8. *You have to drive* 300 *miles. For the first three hours, you drive* 50 *miles per hour. How much longer will you have to drive if you increase your speed to* 65 *miles per hour?*

   a. **$2\frac{4}{13}$ *hours***
   b. $2\frac{1}{2}$ *hours*
   c. 3 *hours*
   d. $3\frac{1}{13}$ *hours*
   e. 2 *hours*

$Distance = Rate \cdot Time$

$Distance = (50\ mph)(3\ hours) = 150\ miles$

*So far, you have travelled* 150 *miles, which means you have* 150 *miles* (*or* $300 - 150$ *miles*) *to go.*

$Time = \frac{Distance}{Rate} = \frac{150\ miles}{65\ mph} = \mathbf{2\frac{4}{13}\ hours}$

9. *If you travel 6 hours at 50 miles per hour, and then 3 hours at 75 miles per hour, what was your average speed?*

   a. $62\frac{1}{2}$ *miles per hour*
   b. $57\frac{1}{4}$ *miles per hour*
   c. 60 *miles per hour*
   d. 55 *miles per hour*
   **e. $\mathbf{58\frac{1}{3}}$ *miles per hour***

$$Distance = Rate \cdot Time$$
$$Distance = (50\ mph)(6\ hours) = 300\ miles$$
$$Distance = (75\ mph)(3\ hours) = 225\ miles$$
$$Average\ speed = \frac{total\ number\ of\ miles}{total\ number\ of\ hours}$$
$$Average\ speed = \frac{300 + 225}{6 + 3} = \frac{525}{9} = \mathbf{58\frac{1}{3}\ mph}$$

10. *A recipe uses $2\frac{1}{2}$ cups of flour for each cup of milk; how many cups of flour must be used with $1\frac{1}{2}$ cups of milk?*

    a. 3 *cups*
    b. $3\frac{1}{2}$ *cups*
    **c. $\mathbf{3\frac{3}{4}}$ *cups***
    d. $3\frac{7}{8}$ *cups*
    e. 4 *cups*

$$\frac{2\frac{1}{2}\ cups\ of\ flour}{1\ cup\ of\ milk} = \frac{x\ cups\ of\ flour}{1\frac{1}{2}\ cups\ of\ milk}$$
$$x = \left(2\frac{1}{2}\right)\left(1\frac{1}{2}\right) = \left(\frac{5}{2}\right)\left(\frac{3}{2}\right) = \frac{15}{4} = \mathbf{3\frac{1}{4}\ cups\ of\ flour}$$

11. *If you have 30 gallons of fuel that is 4 parts gasoline to 1 part alcohol, how many gallons of alcohol does your fuel contain?*

    a. 5 *gallons*
    **b. 6 *gallons***
    c. 7 *gallons*
    d. 24 *gallons*
    e. 25 *gallons*

$$1\ part\ alcohol + 4\ parts\ gasoline = 5\ parts\ fuel\ mixture$$
$$\frac{1\ alcohol}{5\ fuel} = \frac{x\ alcohol}{30\ fuel}$$
$$5x = 30 \qquad x = \mathbf{6\ gallons}$$

12. *3 is what percent of 4.0?*

    **a. 75%**
    b. 70%
    c. 60%
    d. 65%
    e. 55%

$$Percentage = \frac{part}{whole} \times 100$$
$$x = \frac{3}{4} \times 100 = \mathbf{75\%}$$

13. *If you need 40 pens and a case contains 500 pens, what percent of 40 does the box contain?*

    a. 8%
    b. 12.5%
    c. 125%
    d. **1250%**
    e. 2000%

$$Percentage = \frac{part}{whole}$$

*Watch the wording of this question.*

$$x = \frac{500}{40} \times 100 = (12.5)(100) = \mathbf{1250\%}$$

14. *If you own* 8 *acres of land and* $\frac{1}{2}$ *of an acre of this land is swamp, what percent of your land is swampland?*

a. 5%
b. **6.25%**
c. 5.5%
d. 20%
e. 25%

$$Percentage = \frac{part}{whole} \times 100$$

$$x = \frac{.5}{8} \times 100 = (0.0625)(100) = \mathbf{6.25\%}$$

15. *In September, a shirt is originally priced at* \$30.00; *in October, it is then reduced by* 25%. *In November, the price of the shirt is increased by* 25%. *What is the price of this shirt in November?*

a. \$30.00
b. \$31.00
c. \$29.95
d. \$27.50
e. **\$28.12**

$$25\% \text{ of } \$30.00 = (.25)(\$30) = \$7.50$$
$$October\ price = \$30.00 - \$7.50 = \$22.50$$
$$25\% \text{ of } \$22.50 = (.25)(\$22.50) = \$5.62$$
$$November\ price = \$22.50 + \$5.62 = \mathbf{\$28.12}$$

16. *In problem* 15, *what was the amount of the price increase in November? HINT: Pay attention to what the question is asking.*

a. \$7.50
b. \$37.50
c. **\$5.62**
d. \$8.24
e. \$28.12

$$25\% \text{ of } \$30.00 = (.25)(\$30) = \$7.50$$
$$October\ price = \$30.00 - \$7.50 = \mathbf{\$22.50}$$

17. *On a* 40 *question test, you answered* 60% *of the* 35 *algebra questions correctly, and* 80% *of the* 5 *prealgebra problems correctly. What percent of the* 40 *total questions did you answer correctly?*

a. 60%
b. 70%
c. 55%
d. **62.5%**
e. 64.75%

$$60\% \text{ of } 35 = (.6)(35) = 21 \text{ correct answers}$$
$$80\% \text{ of } 5 = (.8)(5) = 4 \text{ correct answers}$$
$$21 + 4 = 25 \text{ total correct answers}$$
$$x = \frac{25}{40} \times 100 = (0.625)(100) = \mathbf{62.5\%}$$

18. *If* $\frac{3}{8}$ *of the* 32 *students in your class received an A, and* $\frac{1}{2}$ *of the rest received a B or C, then how many received a D or lower?*

a. 6
b. 9
c. **10**
d. 12
e. 13

$$\frac{3}{8} of\ 32 = \frac{3}{8} \times 32 = \frac{(3)(32)}{8} = 12 \text{ students who received an } A$$
$$\frac{1}{2} of \text{ the } 20 \text{ remaining students} = \frac{1}{2} \times 20 = 10 \ B \text{ or } C \text{ students}$$
$$Remaining\ students\ who\ received\ D\ or\ F$$
$$= 32 - 12 - 10 = \mathbf{10\ students}$$

19. *In* 2006, *the population of Joliet was* 80,000; *in* 2007, *it was* 82,000. *What percent did the population increase from* 2006 *to* 2007?

a. 2%
b. **2.5%**
c. 3%
d. 2.44%
e. 2.72%

$$Percent\ Increase = \frac{amount\ of\ increase}{original\ amount} \times 100$$

$$Percent\ Increase = \frac{82{,}000 - 80{,}000}{80{,}000} \times 100$$

$$= \frac{2{,}000}{80{,}000} \times 100 = 2.5\%$$

20. *How much money would you have if you put* $5,000.00 *in the bank for* 6 *months at a* 6.25% *interest rate*?

a. $156.25
b. $200.00
c. $550.00
d. $5,100.00
**e. $5,156.25**

$$Interest = (principal)(rate)(time)$$

$$Interest = (5000)(.0625)\left(\frac{6}{12}\right) = \$156.25$$

$$5000 + 156.25 = \$5{,}156.25$$

*Pay attention to what the question is asking; in this case, you are asked to find how much money you will have after this transaction (interest + principal), not just the interest.*

21. *A box of rocks weighs* 100 *pounds. If half the rocks are removed, the box weighs* 51 *pounds. How much does the box weigh empty*?

a. 1 *pound*
b. **2 *pounds***
c. 3 *pounds*
d. 4 *pounds*
e. ½ *pounds*

*There are several questions in the prealgebra portion of the ACT COMPASS math test that do not follow a specific formula. You must break down these problems and use logic to solve them.*

*For example, in this problem after* $\frac{1}{2}$ *of the rocks are removed, the box weighs* 51 *pounds,*

*therefore* $\frac{1}{2}$ *of the rocks must weigh* $100 - 51 = 49$ *pounds,*

*thus all the rocks must weigh* $49 \times 2 = 98$ *pounds,*

*therefore the empty box weighs* $100 - 98 = 2$ *pounds.*