Apprentice Gas Technician Test (AGT)

Preparation Guide
SAMPLE TEST
GAS TECHNICIAN APPRENTICE ENTRANCE EXAM

1. Multiply and simplify.
\[
\frac{3x^4}{4} \cdot \frac{-8x}{9x^3} \Rightarrow
\]

2. Divide and simplify.
\[
\frac{12y}{5y^3} \div \frac{6}{15y^3} \Rightarrow
\]

3. If Rick wants to cut a 10' stick of conduit into 6 equal lengths, what length must be cut? Express your answer in feet and inches.

\[
10' \div 6 = \_\_\_
\]

Each piece would measure 1' 8".

4. Subtract and simplify.
\[
15 \frac{2}{3} - 3 \frac{1}{2}
\]
5. Simplify
\[ \frac{x^3 y^2}{xy^3} \Rightarrow \]

\[ \left( \frac{6y}{9y^2} \right)^2 \Rightarrow \]

7. Find the parameter of the shape below:

Parameter = \( \left( \rule{3cm}{0.5pt} \right) \)

(Two semicircle +

Two legs for

rectangle)

8. What is the tax percentage if an item costs $14.50 but you are charged $15.00?

\[ \% = \frac{15.00 - 14.50}{14.50} = \]
9. Subtract:

\[
\frac{4x}{3} - \frac{x}{6} -
\]

10. Solve for variable and simplify:

\[
3y - 8 = 16
\]

11. Multiply:

\[
4 (3x^2 - 2x + 1) \Rightarrow
\]

12. Multiply:

\[
(2x - 1) (3x + 2) =
\]

13. Find the area of the triangle.

\[
\text{Area =}
\]

\[
\text{Area =}
\]

\[
\text{Area =}
\]
14. Find the area for the circle:

\[ R = 8 \text{ feet} \]

15. Using Phythagorean Theorem \((c^2 = a^2 + b^2)\) find the length of \(a\).

\[ b = 12 \quad c = 18 \]

\[ a = {?} \]

16. If a bike wheel is 26" in diameter, how far will it travel in 10 revolutions?
17. Find the volume of 1" pipe that is 10' long? I.D. of pipe is ¾ inches.

18. The two rectangles shown are similar. Find the width of the smaller rectangle.
19. Jim is going to pour a concrete patio. The patio is 15' x 25'. There is a tree in the middle that requires a 4' diameter opening. How many yards of concrete will Jim need if the patio is 6" thick?
SOLUTIONS TO
AGT PREPARATION GUIDE
1. Multiply and simplify.

\[
\frac{3x^4}{4} \cdot \frac{-8x}{9x^3} = \frac{2 \cdot x \cdot x \cdot x \cdot x}{2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x} = -\frac{2 \cdot 2 \cdot 2 \cdot x}{3}
\]

2. Divide and simplify.

\[
\frac{12y}{5y^3} + \frac{6}{15y^3} = \frac{2 \cdot 2 \cdot 3 \cdot y}{5 \cdot y \cdot y \cdot y \cdot y \cdot y} \cdot \frac{2}{3} \Rightarrow \frac{2 \cdot 3 \cdot y \cdot y \cdot y}{1} = 6y^3
\]

3. If Rick wants to cut a 10’ stick of conduit into 6 equal lengths, what length must be cut? Express your answer in feet and inches.

\[
10' \div 6 \Rightarrow \frac{10}{6} = \frac{5}{3} = \frac{5}{3} \text{ of a foot or 1-2/3’}
\]

\[
2/3 \text{ of } 12” \Rightarrow \frac{24}{3} \Rightarrow \frac{2 \cdot 2 \cdot 2}{3} = 8 \text{ inches}
\]

Each piece would measure 1’-8’

4. Subtract and simplify.

\[
15 \frac{2}{3} - 3 \frac{1}{2}
\]

\[
15 \frac{2}{3} - 3 \frac{1}{2} \Rightarrow \frac{47}{3} - \frac{2}{3} \Rightarrow \frac{94}{6} - \frac{21}{6} \Rightarrow \frac{73}{6} \Rightarrow 12 \frac{1}{6}
\]
5. Simplify
\[
\frac{x^3y}{xy} \Rightarrow \frac{x \times x \times x}{x \times y \times y \times y \times y} \Rightarrow \frac{x \times x}{y \times y \times y} \Rightarrow \frac{x^2}{y^3}
\]

6. Simplify
\[
\left( \frac{6x}{9y^3} \right)^2 \Rightarrow \frac{36x^2}{81y^6} \Rightarrow \frac{2 \times 2 \times 3 \times 3 \times x \times x \times y \times y \times y \times y \times y \times y}{3 \times 3 \times y \times y \times y \times y \times y \times y} \Rightarrow \frac{4x^2}{9y^6}
\]

7. Find the perimeter of the shape below:

Parameter = (Two semicircles + two legs for rectangle)

Parameter = (2 \times \pi r) + (2 \times 10")

= \left(2 \times \pi \times (6") \right) + 20" = (2\pi \times 3) + 20"

= 38.85"

8. What is the tax percentage if an item costs $14.50 but you are charged $15.00?

\[
\% = \frac{15.00 - 14.50}{14.50} = .0345
\]

.0345 \times 100 = 3.45\%
9. Subtract:

\[
\frac{4x}{3} - \frac{x}{6} - \frac{4x}{3} = \frac{4x}{3} \cdot \frac{2}{3} \Rightarrow \frac{8x}{6} = \frac{x}{6} \Rightarrow \frac{7x}{6}
\]

10. Solve for variable and simplify:

\[
3y - 8 = 16 \Rightarrow 3y - 8 + 8 = 16 + 8
\]

\[
3y = 24 \Rightarrow \frac{3y}{3} = \frac{24}{3} \Rightarrow \frac{24}{3} \Rightarrow y = 8
\]

11. Multiply:

\[
4(3x^2 - 2x + 1) \Rightarrow 4 \cdot 3x^2 - 4 \cdot 2x + 4 = 1
\]

\[
12x^2 - 8x + 4
\]

12. Multiply:

\[
(2x - 1)(3x + 2) \Rightarrow 2x \cdot 3x + 2x \cdot 2 - 1 \cdot 3x - 1 \cdot 2
\]

\[
= 6x^2 + 4x - 3x - 2
\]

\[
= 6x^2 + x - 2
\]

13. Find the area of the triangle.

\[
Area = \frac{1}{2} b \cdot h
\]

\[
Area = \frac{1}{2} \cdot (24''') \cdot (12'')
\]

\[
Area = 144 \text{ in}^2
\]
14. Find the area for the circle:

\[ R = 8 \text{ feet} \]

Area = \( \pi r^2 \)
Area = \( \pi (8)^2 \)
Area = \( \pi 64 \)
Area = 201 \( \text{ft}^2 \)

15. Using Phythagorean Theorem \( c^2 = a^2 + b^2 \) find the length of \( a \).

\[ \begin{align*}
  b &= 12 \\
  c &= 18
\end{align*} \]

\[ \begin{align*}
  c^2 &= a^2 + b^2 \\
  a^2 &= c^2 - b^2 \\
  a &= \sqrt{c^2 - b^2} \\
  a &= \sqrt{(18)^2 - (12)^2} \\
  a &= 13.4
\end{align*} \]

16. If a bike wheel is 26" in diameter, how far will it travel in 10 revolutions?

One revolution = circumference of wheel
Circumference = \( 2 \pi r \) or \( \pi d = (26\text{"}) \pi \)
Circumference = 81.68 inches

Total Distance = 10 x one revolution

Total Distance = 10 x (81.68"")

= 816.8 inches
17. Find the volume of 1" pipe that is 10' long? I.D. of pipe is 3/4 inches.

Volume = Volume of a cylinder = Area circle x height

Area of circle = \( \pi r^2 \) or \( \pi \frac{d^2}{2} \)

Area of circle = \( \pi \left(\frac{3}{4}\right)^2 \) = 0.4418 in\(^2\)

Height = 10' convert to inches

\( 10' \times \frac{12''}{1'} = 120'' \)

Volume = Area \( A \) x Height = 0.4418 x 120

Volume = 53.0 in\(^3\)

18. The two rectangles shown are similar. Find the width of the smaller rectangle.

\[ \frac{8}{20} = \frac{W}{5} \]

\[ 5 \times 8 = \frac{W \times 3}{20} \]

\[ W = \frac{40}{20} \Rightarrow W = 2 \]
19. Jim is going to pour a concrete patio. The patio is 15' x 25'. There is a tree in the middle that requires a 4' diameter opening. How many yards of concrete will Jim need if the patio is 6" thick?

\[ \text{Area of patio} = W \times L = 15' \times 25' = 375 \text{ ft}^2 \]

\[ \text{Area of tree opening} = \pi \left( \frac{D}{2} \right)^2 = \pi (4')^2 = \pi (4) = 12.6 \text{ ft}^2 \]

\[ \text{Total Area} = \text{Area of patio} - \text{Area of tree opening} = 375 \text{ ft}^2 - 12.6 \text{ ft}^2 = 362.4 \text{ ft}^2 \]

\[ \text{Volume} = \text{Area} \times \text{Thickness} = 362.4 \text{ ft}^2 \times \frac{1}{2} \text{ ft} = 181.2 \text{ ft}^3 \]

\[ \text{Yards of Concrete} = 27 \text{ ft}^3 \text{ per yard} \]

\[ \text{Total Yards of Concrete} = \frac{\text{Volume}}{27} = \frac{181.2 \text{ ft}^3}{27} = 6.7 \text{ yards of concrete} \]