

# Solutions to MCAT

Style Math Quiz Questions

(c) Leah4Sci.com / MCAT

Remember - on the MCAT, close enough is **GOOD ENOUGH!!**

\* Calculator values will be shown in red for estimation comparison

For help with tricks & concepts refer back to my MCAT MATH video series

[Leah4Sci.com/MCAT-Math](http://Leah4Sci.com/MCAT-Math)

$$\textcircled{1} \quad \begin{array}{l} 30 \\ \uparrow \\ 27 \end{array} + \begin{array}{l} \downarrow \\ 40 \\ 42 \end{array} =$$

$$30 + 40 = 70 \quad (3+4=7)$$

$$\text{calc} = 69$$

$$\textcircled{2} \quad \begin{array}{l} \downarrow \\ 2.5 \\ 2.65 \end{array} + \begin{array}{l} \uparrow 4 \\ 3.79 \end{array} =$$

$$2.5 + 4 = 6.5$$

$$\text{calc} = 6.44$$

$$\textcircled{3} \quad \begin{array}{l} \uparrow 99000 \\ 98473 \end{array} - \begin{array}{l} \downarrow 6000 \\ 6297 \end{array} =$$

$$\begin{array}{r} \underline{99000} - \underline{6000} \quad 9-6=3 \\ \rightarrow 93000 \end{array}$$

$$\text{calc} = 92176$$

$$\textcircled{4} \quad 5.17 \times \underline{10} =$$

$$51.7 \quad \leftarrow \text{exact}$$

$$\textcircled{5} \quad \begin{array}{l} \uparrow \text{backwards} \\ 9663 \end{array} \div 10 \textcircled{2} = \quad \leftarrow \text{2 units of 10}$$

$$96.63 \quad \leftarrow \text{exact}$$

⑥  $642 \div 10^2 =$  2 units of 10  
 backwards

$0.642$  or  $6.42 \times 10^{-1}$  (exact)

⑦  $3.17 \times 10^{-2} \times 800 =$  2 right decimals  
 2 left decimals

$3 \times 10^{-2} = 0.03 \times 800$

$3 \times 8 = 24$   
 Calc = 25.1

⑧  $0.041 \div 0.0093 =$   
 0.04      ↑ 0.01

$\frac{0.04}{0.01} \times \frac{100}{100} \rightarrow \frac{4}{1} = 4$   
 Calc = 4.41

⑨  $4.37 \div 0.0213 =$   
 ↑ 4.5      ↓ 0.02

$\frac{4.5}{0.02} \times \frac{100}{100} \rightarrow \frac{450}{2} \text{ same as } \frac{45 \times 10}{2}$

$\sim 22 \times 10 = 220$   
 Calc = 205

requires same exponent

$$\textcircled{10} \quad 2.61 \times 10^{-2} - 6.3 \times 10^{-3} =$$

$$\downarrow \qquad \qquad \qquad \downarrow$$

$$2.6 \times 10^{-2} \qquad \qquad 6 \times 10^{-3}$$

$$6 \times 10^{-3} = 0.6 \times 10^{-2}$$

$$2.6 \times 10^{-2} - 0.6 \times 10^{-2} = 2 \times 10^{-2}$$

$$2.6 - 0.6 = 2$$

$$\text{Calc} = 1.98 \times 10^{-2}$$

$$\textcircled{11} \quad 3.39 \times 10^{-3} \times 6.02 \times 10^{23} =$$

$$\uparrow \qquad \qquad \downarrow$$

$$3.5 \qquad \qquad 6.00$$

add exponents  $\rightarrow -3 + 23 = 20$

$$3 \times 6 < 3.5 \times 6 < 4 \times 6 \rightarrow 21 \times 10^{20}$$

$$18 \qquad \qquad 21 \qquad \qquad 24$$

$$2.1 \times 10^{21}$$

$$\text{Calc} = 2.04 \times 10^{21}$$

$$\textcircled{12} \quad 2.83 \times 10^{-4} \div 2.1 \times 10^{-5} =$$

$$\uparrow \qquad \qquad \downarrow$$

$$3 \qquad \qquad 2$$

subtract exponents  $-4 - (-5) = +1$

$$3 \div 2 = 1.5 \times 10^1 = 15$$

$$\text{Calc} = 13.5$$

$$\textcircled{13} \quad (6.43 \times 10^{-2})^2 =$$

$$6^2 < 6.43^2 < 7^2$$

$$\downarrow \qquad \qquad \downarrow$$

$$36 < 42 < 49$$

multiply  $10^{-2} (2) = 10^{-4}$

$$= 42 \times 10^{-4} = 4.2 \times 10^{-3}$$

$$\text{Calc} = 4.13 \times 10^{-3}$$

(14)

$$\sqrt{63179} =$$

$$\sim \sqrt{62500}$$

$$\sqrt{625} \quad \sqrt{100}$$

$$25 \times 10 \rightarrow 250$$

$$\text{Calc} = 251$$

(15)

$$(3.01 \times 10^3)^{\frac{1}{2}} = \text{square root}$$

3

$$\sqrt{3 \times 10^3} = \sqrt{3000}$$

$$\sqrt{30} \quad \sqrt{100}$$

$$\sqrt{25} < \sqrt{30} < \sqrt{36}$$

$$5 < 5.5 < 6$$

$$5.5 \times 10 = 55$$

$$\text{Calc} = 54.8$$

(16)

$$\frac{39}{18} \times \frac{0.43}{412} \times \frac{7.3}{0.03} =$$

\* Simplify

rewrite if too messy

$$\frac{1}{1} \times \frac{0.03}{10} \times \frac{7.3}{0.03}$$

$$\frac{7.3}{10}$$

$$\rightarrow 0.73$$

$$\text{Calc} = 0.691$$

⑰ Find 14% of  $5.72 \times 10^{-2}$

→ same as 0.14

$0.15 \times 5.72 \times 10^{-2}$        $6 \times 10^{-2} = 0.06$

both round up must be less

$0.15 \times 0.06 = 0.009 < 0.009$   
 $\rightarrow < 9 \times 10^{-3}$

or  $0.15 \times 6 \times 10^{-2}$

↓

$15 \times 10^{-2} \times 6 \times 10^{-2}$       add exponents

$\rightarrow 90 \times 10^{-4} = 9 \times 10^{-3}$

Calc =  $8.61 \times 10^{-3}$

⑱ Express  $\frac{4.1 \times 10^1}{2.4 \times 10^2}$  as a %

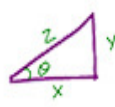
divide out 7

0.7

Subtract  $1 - 2 = -1$

$\frac{0.7}{0.5} \times 10^{-1}$        $\frac{7}{5} \times 10^{-1} = 1.4$

$0.14 = 14\%$   
Calc = 14.4%

⑲  if  $z = 9.1$  and  $\theta = 62^\circ$  find  $y$

syn


$9.1 \sin 62^\circ$

↓      ↓

$9 \sin 60 < 0.9$        $9 \times 0.9 = 8.1$

Calc = 8.03

tricky

⑳  if  $y = 5.6$  and  $z = 11.2$  find  $\theta$

$y$  is adjacent so use cos

$\frac{11.2}{11.2} \cos \theta = \frac{5.6}{5.6} = \frac{1}{2}$        $\cos 60 = \frac{1}{2}$   
 $\frac{11.2}{11.2} \div 5.6 = \frac{1}{2}$       exact

(21)

$$\cos 48.8^\circ =$$

inverse  $\rightarrow \cos 45 < \cos 48.8 < \cos 60$



$$0.7 > 0.65 > 0.5$$

high  $\cos =$  low value OR...  $\cos 48.8$  closest to  $\cos 45$ . so answer closest

to 0.7

Segment method

$$45 \quad \text{---} \quad 50 \quad \text{---} \quad 55 \quad \text{---} \quad 60$$

↑  
in first third

↙  
in last third

$$0.5 \quad \text{---} \quad 0.57 \quad \text{---} \quad 0.64 \quad \text{---} \quad 0.71$$

$$\sim 0.65$$

$$\text{Calc} = 0.66$$

(22)

$$\log \frac{583}{62} =$$

$$\log \frac{\cancel{600}}{\cancel{160}}$$

$$\log \frac{10}{1} = \log 10 = 1$$

$$\text{Calc} = 0.97$$

(23)

$$-\log(9.47 \times 10^{-7}) =$$

$$-\log(1 \times 10^{-6}) \rightarrow 6$$

$$\text{Calc} = 6.02$$



24

$$-\log(8.5 \times 10^{-3}) =$$

quick estimate  $8.5 \times 10^{-3} \rightarrow 1 \times 10^{-2}$

$-\log(1 \times 10^{-2}) = 2$

more detailed estimate

$$-\log 8 \times 10^{-x} \rightarrow \#.1$$

$$-\log \# \times 10^{-2} \rightarrow 2 \rightarrow 2.1$$

$$\text{Calc} = 2.07$$

25

Antilog of 3 =

3 units of 10 = 1000

Antilog is power  $10^x$

or  $10^3$

$$10^3 = 1000$$

26

$$10^{-9.3} \sim 10^{-10} = 1 \times 10^{-10}$$

looks extreme but close enough for MCAT  
 $\text{Calc} = 5 \times 10^{-10}$

27

$$-\log x = 0.1, \quad x =$$

refer to math cheat sheet

$$-\log(8 \times 10^{-x}) = (\#.1)$$

$$\# = x - 1$$

$$0 = x - 1$$

$$-\log(8 \times 10^{-x}) = 0.1$$

$$x = 8 \times 10^{-1}$$

simply put if  $-\log x = 0.1$   $\rightarrow 8 \times 10^{-1}$

$$\text{Calc} = 7.9 \times 10^{-1}$$

(A)

$$\sqrt{\frac{2 \times 3.6 \times 10^{-5}}{1.4 \times 10^{-3}}} =$$

(B)

$$\left(\frac{2.79}{9}\right)^3 =$$

Bonus Q's

Bonus A

$$\sqrt{\frac{2 \times 3.6 \times 10^{-5}}{1.4 \times 10^{-3}}} \rightarrow \sqrt{\frac{2 \times \cancel{3.5} \times 10^{-5}}{\cancel{1.4} \times 10^{-3}}}$$

0.5  
0.2 decimal trick

$$\sqrt{5 \times 10^{-2}} \leftarrow \sqrt{\frac{5 \times 10^{-5}}{10^{-3}}} \leftarrow \sqrt{\frac{2 \times 5 \times 10^{-5}}{2 \times 10^{-3}}}$$

$$\sqrt{5} \times (10^{-2})^{\frac{1}{2}} \quad \sqrt{5} \times 10^{-1}$$

$$\sqrt{4} < \sqrt{5} < \sqrt{9} \quad \rightarrow 2.5 \times 10^{-1} = 0.25$$

Calc = 0.23

Bonus B

$$\left(\frac{2.79}{9}\right)^3 \sim \left(\frac{2.7}{9}\right)^3 = \left(\frac{0.3}{1}\right)^3$$

$$(0.3)^3 \rightarrow 3^3 + \underline{3} \text{ left decimals}$$

$$\underline{0.27} = 0.027$$

Calc = 0.0298