ADVANCED MATH PRACTICE TEST 1

Name_____ Date_____

Directions: Complete as many problems as you can in the 30 minutes allotted to you. No calculators!

1. Which point satisfies $5y-2x<-25$?

   (**A**) $(9,-1)$ (**B**) $(4,-4)$ (**C**) $(-14,5)$ (**D**) $(-7,-2)$ (**E**) $(2,-3)$

2. If $a=\dfrac{b^3c^{-4}}{d^5}$ and $c=b^{-3}d^{-4}$, then a =

   (**A**) $b^{-4}d^{-13}$ (**B**) $b^{-4}d^{3}$ (**C**) $b^{36}d^{-80}$ (**D**) $b^{15}d^{11}$ (**E**) $b^{15}d^{21}$

3. $\left(4a^{3x^3}\right)^2=$

   (**A**) $8a^{9x^6}$ (**B**) $16a^{9x^6}$ (**C**) $16a^{6x^3}$ (**D**) $16a^{6x^9}$ (**E**) $16a^{9x^9}$

4. Simplify $(x-2)^6(x+2)^3(x-2)^{-3}(x+2)^{-2}(x-2)^{-2}$.

   (**A**) $(x-2)^{-1}(x+2)^{-3}$ (**B**) $(x-2)^{36}(x+2)^{-6}$ (**C**) $(x-2)^{-1}(x+2)$ (**D**) $(x-2)(x+2)^{-3}$ (**E**) x^2-4

5. The perimeter of a rectangle is $12x-40$ and the length is $2x-4$. Find the width.

   (**A**) $x-6$ (**B**) $4x-24$ (**C**) $4x-16$ (**D**) $10x-44$ (**E**) $10x-36$

6. The slope of $-10x-24=-12y$ is how much greater than the slope of $-6y-10=5x$?

   (**A**) $-\dfrac{5}{3}$ (**B**) 0 (**C**) $\dfrac{5}{12}$ (**D**) $\dfrac{5}{6}$ (**E**) $\dfrac{5}{3}$

7. If $2x-4y-1=0$, find the product of the *x* and *y* intercept.

   (**A**) $-\dfrac{1}{6}$ (**B**) $-\dfrac{1}{8}$ (**C**) $\dfrac{1}{6}$ (**D**) $\dfrac{1}{8}$ (**E**) -6

8. If $\dfrac{a}{\frac{1}{3}}=4$, then $\dfrac{a}{\frac{2}{3}}=$

   (**A**) $\dfrac{1}{2}$ (**B**) $\dfrac{8}{9}$ (**C**) 2 (**D**) 8 (**E**) 18

9. Simplify $\dfrac{2.7^2}{-2.7^2+2.7^2}$

   (**A**) 0 (**B**) $\dfrac{1}{2}$ (**C**) $\dfrac{10}{27}$ (**D**) 2 (**E**) undefined

10. If an old computer can solve 100 math problems in *s* hours and a new computer can solve the same problems in *h* seconds, how much time, in *hours*, will you save if you use the new computer instead of the old computer?

    (**A**) $s-\dfrac{h}{3600}$ (**B**) $s-60h$ (**C**) $3600s-h$ (**D**) $60s-h$ (**E**) $s-3600h$

11. $\sqrt{\dfrac{1}{9}+\dfrac{1}{16}}=$

    (**A**) $\dfrac{1}{3}+\dfrac{1}{8}$ (**B**) $\dfrac{1}{3}+\dfrac{1}{4}$ (**C**) $\dfrac{1}{3}\times\dfrac{1}{4}$ (**D**) $\dfrac{5}{12}$ (**E**) $\dfrac{5}{144}$

12. Find the average of the following three algebraic expressions: $4l^3+3l^2$, $-7l^3-l$, and $-9l^2-11l$

    (**A**) $-l^3-2l^2-4l$ (**B**) $-l^3+2l^2-4l$ (**C**) $-l^3-2l^2+4l$ (**D**) l^3-2l^2-4l (**E**) $\dfrac{11l^3+12l^2+10l}{3}$

13. If a school contains *t* students of which *s* are girls, which of the following would be equivalent to the ratio of boys to girls?

    (**A**) $\dfrac{-3st}{-3t^2+3st}$ (**B**) $\dfrac{-3s^2}{-3st+3s^2}$ (**C**) $\dfrac{-3st-3s^2}{-3s^2}$ (**D**) $\dfrac{-3st+3t^2}{3st}$ (**E**) $\dfrac{-3t+3st}{-3s}$

14. Simplify $(6a-3b-5a+4b)\div\dfrac{(8a-b-7a+2b)}{(-4a-2b+b+5a)}$.

(**A**) $a-b$ (**B**) $a+b$ (**C**) $b-a$ (**D**) $\dfrac{a}{b}$ (**E**) $\dfrac{b}{a}$

15. If one square has a length of $(k-4)$ inches and another square has a length of $(k-9)$ inches, what is the difference between the two areas in square inches?

(**A**) 25 (**B**) $10k-10$ (**C**) $10k-65$ (**D**) $10k+97$ (**E**) $18k-65$

16. If $8\left(14\pi-\sqrt{3y}\right)=\dfrac{16}{3}$, what is the value of $\dfrac{14\pi-\sqrt{3y}}{4}$?

(**A**) $\dfrac{1}{6}$ (**B**) $\dfrac{4}{3}$ (**C**) $\dfrac{8}{3}$ (**D**) $\dfrac{32}{3}$ (**E**) $\dfrac{512}{3}$

17. When solving $\log(4x+5)-2\log 5=3$, which of the following equations will result?

(**A**) $100x+125=1{,}000$ (**B**) $4x+5=25{,}000$ (**C**) $4x+5=750$ (**D**) $4x-5=1{,}000$ (**E**) $4x+5-32=1{,}000$

18. The area of a rectangle is $xy-4zx+2y-8z$ and the length is $x+2$. Find the ratio of the length to the width.

(**A**) $\dfrac{x}{y+2z}$ (**B**) $\dfrac{x+2}{y+4z}$ (**C**) $\dfrac{x+2}{-y-4z}$ (**D**) $\dfrac{x+2}{4z-y}$ (**E**) $\dfrac{x+2}{y-4z}$

19. If $\dfrac{6r-4k}{3}=4$ and $3r+4k=8$, find the value of $\dfrac{9}{5}r$.

(**A**) 4 (**B**) 6 (**C**) 9 (**D**) 18 (**E**) 27

20. Simplify $\dfrac{2a+2b-2c}{5c+a+b-6c}$

(**A**) 2 (**B**) 6 (**C**) $a+b-c$ (**D**) $2(a+b-c)$ (**E**) $2a+2b-\dfrac{2}{5}c$

21. If the diameter of the sphere is doubled, how many times greater will the volume become?

(**A**) 2 (**B**) 4 (**C**) 6 (**D**) 8 (**E**) 10

22. In *k* more years, Sue will be *h* years old. How old was Sue *j* years ago?

(**A**) $k-h-j$ (**B**) $h-k-j$ (**C**) $h+k-j$ (**D**) $h-k+j$ (**E**) $h-k$

23. If $x^{\frac{3}{4}}y^{\frac{2}{3}}=16$, find the value of $\dfrac{1}{x^{\frac{3}{4}}}$ when $y^{\frac{2}{3}}$ equals 2.

(**A**) $\dfrac{1}{14}$ (**B**) $\dfrac{1}{8}$ (**C**) 8 (**D**) 14 (**E**) 32

24. $4a^2-\dfrac{3}{a}$ is equivalent to which of the following?

(**A**) a (**B**) a^2 (**C**) $3\dfrac{2}{3}a$ (**D**) $4a-3$ (**E**) $\dfrac{4a^3-3}{a}$

25. If $m=-3k^4-2k^3+4k^2+1$ and $n=6k^4-8k^3-10k^2-5$, find the value of $m-n$.

(**A**) $-9k^4+6k^3-6k^2+6$ (**B**) $-9k^4-10k^3-6k^2-4$ (**C**) $-9k^4-10k^3+14k^2+6$

(**D**) $-9k^4+6k^3+14k^2+6$ (**E**) $-9k^4+6k^3+14k^2-4$

ADVANCED MATH PRACTICE TEST 2

Name_____ **Date**_____

Directions: Complete as many problems as you can in the 30 minutes allotted to you. No calculators!

1. Given $\frac{40\%}{x}+\frac{40\%}{x}=80$. Find *x*.

   (**A**) 0.0025 (**B**) 0.005 (**C**) 0.01 (**D**) 0.1 (**E**) 1

2. If $\left[\left(x-y\right)^{0.25}\right]^4-7=-28.12$, find the value of $3+\left[\left(x-y\right)^{0.25}\right]^4$.

   (**A**) -38.12 (**B**) -32.12 (**C**) -24.12 (**D**) -21.12 (**E**) -18.12

3. Find the value of $\left(\sqrt[3]{-x^2-4x}\right)^3$ if $2-x=4$.

   (**A**) 0 (**B**) 1 (**C**) 4 (**D**) 10 (**E**) 12

4. Solve $\frac{u_1w_1}{v_1}=\frac{u_2w_2}{v_2}$ for v_2.

   (**A**) $\frac{u_2v_1w_2}{u_1w_1}$ (**B**) $\frac{u_1w_1}{u_2v_1w_2}$ (**C**) $\frac{u_1v_1w_1}{u_2w_2}$ (**D**) $\frac{u_2w_2}{u_1v_1w_1}$ (**E**) $\frac{u_1v_1u_2}{w_1w_2}$

5. If $v=-0.5$, then which of the following is true?

   (**A**) $\frac{1}{v^8}<\frac{1}{v^9}<\frac{1}{v^{10}}$ (**B**) $\frac{1}{v^{10}}<\frac{1}{v^9}<\frac{1}{v^8}$ (**C**) $\frac{1}{v^{10}}<\frac{1}{v^8}<\frac{1}{v^9}$ (**D**) $\frac{1}{v^9}<\frac{1}{v^8}<\frac{1}{v^{10}}$ (**E**) $\frac{1}{v^9}<\frac{1}{v^{10}}<\frac{1}{v^8}$

6. If $\frac{12}{4x^2-9}=6$, then $\frac{\left(2x-3\right)\left(2x+3\right)}{12}+7=$

   (**A**) $1\frac{1}{6}$ (**B**) $7\frac{1}{6}$ (**C**) 9 (**D**) 11 (**E**) 13

7. If $\left(a^2+c^2\right)+d=e+f$, then $\frac{\left(a^2+c^2\right)^2}{5}=$

   (**A**) $\frac{\left(e+f-d\right)^2}{5}$ (**B**) $\frac{\left(e+f-d\right)^2}{25}$ (**C**) $\frac{\left(e+f+d\right)^2}{5}$ (**D**) $\frac{\left(e+f\right)^2}{5d}$ (**E**) $\frac{\left(e+f\right)^2}{25d^2}$

8. Given $\frac{-1}{x-3}=\frac{1}{y+2}$, what is the value of $x-1$?

   (**A**) $-y+4$ (**B**) $y+4$ (**C**) $y-1$ (**D**) $-y$ (**E**) y

9. If $16-8\sqrt[3]{\frac{g+h}{j+k}}=4\sqrt[3]{\frac{g+h}{j+k}}-8$, then $\sqrt[3]{\frac{g+h}{j+k}}-6=$

   (**A**) $-5\frac{1}{3}$ (**B**) -4 (**C**) 0 (**D**) 2 (**E**) 6

10. Find the value of *x* if $\left(\frac{x^2-x-6}{x-3}\right)^4\div\left(\frac{x^2-3x-10}{x-5}\right)^3=6$ where $x\neq-2,3,5$.

    (**A**) -3 (**B**) 1 (**C**) 0 (**D**) 4 (**E**) 5

11. What fraction of $4x^6$ is $2x^2$?

    (**A**) $\frac{2}{x^{-4}}$ (**B**) $\frac{2}{x^4}$ (**C**) $\frac{1}{2x^4}$ (**D**) $\frac{1}{2x^{-4}}$ (**E**) $2x^4$

12. If $x=\frac{m^{-4}b^5}{c^{-2}}$ and $c=\frac{m^{-2}}{b^4}$, then *x* is equivalent to which of the following?

    (**A**) $m^{-8}b^{-3}$ (**B**) b^{-3} (**C**) $m^{-8}b^{13}$ (**D**) b^{13} (**E**) $m^{-8}b^{-11}$

13. Given $6+2-d+b=2$ and $8+d+2=5-g$, find the value of $\frac{\left(g+b\right)^2}{2}$.

    (**A**) 12.5 (**B**) 18 (**C**) 32 (**D**) 50 (**E**) 60.5

14. If golf balls cost *y* dollars each, how many can you buy if you have *x* cents?

(A) $\frac{100x}{y}$ **(B)** $\frac{x}{y}$ **(C)** $\frac{y}{x}$ **(D)** $\frac{y}{100x}$ **(E)** $\frac{x}{100y}$

15. If the smallest of three consecutive odd integers is $\frac{g-3}{5}$, which of the following is equivalent to the largest of the three consecutive odd integers?

(A) $\frac{g+1}{5}$ **(B)** $\frac{g+7}{5}$ **(C)** $\frac{g+12}{5}$ **(D)** $\frac{g+17}{5}$ **(E)** $\frac{g+22}{5}$

16. Find the distance between $(-r, t-5)$ and $(-r, 2t+5)$ assuming $2t+5 > t-5$.

(A) 0 **(B)** t **(C)** $t+10$ **(D)** $3t$ **(E)** $3t+10$

17. Find the midpoint of $(-7c, 8d)$ and $(-23c, -18d)$.

(A) $(-15c, -5d)$ **(B)** $(-8c, -5d)$ **(C)** $(-15c, 13d)$ **(D)** $(-8c, 13d)$ **(E)** $\sqrt{(-16c)^2 + (-26d)^2}$

18. When $2t^4 - 1$ is divided by $t+2$, what is the remainder?

(A) $\frac{-33}{t+2}$ **(B)** $\frac{-31}{t+2}$ **(C)** $\frac{-29}{t+2}$ **(D)** $\frac{29}{t+2}$ **(E)** $\frac{31}{t+2}$

19. Solve $\frac{5}{6}\log_{\frac{1}{8^{\frac{1}{3}}}} 64 = x$. You may have more than one answer.

(A) −4 **(B)** −2 **(C)** 2 **(D)** 3 **(E)** 5

20. Find the value of $\frac{b+c+d}{2}$ for the following system: $\begin{cases} 2b-(c+d)=10 \\ c+d=-2b-2 \end{cases}$

(A) -4 **(B)** -3 **(C)** -2 **(D)** -1 **(E)** $-\frac{1}{2}$

21. $-4\left(\frac{\sqrt[3]{y+z}}{w}\right)^2 + 4\left(\frac{\sqrt[3]{y+z}}{w}\right) + 48$ is equivalent to

(A) $-4\left(\frac{\sqrt[3]{y+z}}{w} - 4\right)\left(\frac{\sqrt[3]{y+z}}{w} - 3\right)$ **(B)** $-4\left(\frac{\sqrt[3]{y+z}}{w} - 4\right)\left(\frac{\sqrt[3]{y+z}}{w} + 3\right)$ **(C)** $-4\left(\frac{\sqrt[3]{y+z}}{w} + 4\right)\left(\frac{\sqrt[3]{y+z}}{w} - 3\right)$

(D) $-4\left(\frac{\sqrt[3]{y+z}}{w} + 4\right)\left(\frac{\sqrt[3]{y+z}}{w} + 3\right)$ **(E)** $-4\left(\frac{\sqrt[3]{y+z}}{w} - 6\right)\left(\frac{\sqrt[3]{y+z}}{w} + 2\right)$

22. Solving the following system for *x* by substitution would yield which equation in the process? $\begin{cases} 3x-2y=4 \\ 4x-y=7 \end{cases}$

(A) $3x+8x+14=4$ **(B)** $3x+8x-14=4$ **(C)** $3x-8x-9=4$ **(D)** $3x-8x-14=4$ **(E)** $3x-8x+14=4$

23. Solve $\log 16 - \log(x-6) = \log x$. You may have more than one answer.

(A) −8 **(B)** −2 **(C)** 1 **(D)** 2 **(E)** 8

24. If a linear equation goes through $(-2, -1687)$ and has a slope of $-\frac{3}{2}$, find the *y*-intercept.

(A) −1690 **(B)** −1689 **(C)** −1688.5 **(D)** −1685 **(E)** −1684

25. Solve $\frac{2}{3}\tan^2 x - 4 = \frac{2}{3}\sec x - \frac{10}{3}$. You may have more than one answer.

(A) 60° **(B)** 300° **(C)** 120° **(D)** 270° **(E)** 180°

ADVANCED MATH PRACTICE TEST 3

Name_____ Date_____

Directions: Complete as many problems as you can in the 30 minutes allotted to you. No calculators!

1. If you bought *c* stamps with *d* dollars, how many cents was each stamp?

(**A**) $\frac{d}{c}$ (**B**) $\frac{100d}{c}$ (**C**) $\frac{100c}{d}$ (**D**) $\frac{c}{d}$ (**E**) $\frac{c}{100d}$

2. You have *m* dollars made up of nickels and dimes. If there are *y* more nickels than dimes, which two equations would best represent this problem? Let *n* represent the number of nickels and *d* represent the number of dimes.

(**A**) $\begin{cases} n = d + y \\ 5n + 10d = 100m \end{cases}$ (**B**) $\begin{cases} n = d + y \\ 5n + 10d = m \end{cases}$ (**C**) $\begin{cases} n + d = y \\ 5n + 10d = 100m \end{cases}$ (**D**) $\begin{cases} d = n + y \\ 5n + 10d = 100m \end{cases}$ (**E**) $\begin{cases} d = n + y \\ 5n + 10d = m \end{cases}$

3. $\frac{2}{a+b} - \frac{2}{b} =$

(**A**) $\frac{2}{a}$ (**B**) $\frac{-a}{a+b}$ (**C**) $\frac{a}{a+b}$ (**D**) $\frac{-2a}{ab+b^2}$ (**E**) $\frac{4b-2a}{ab+b^2}$

4. Which of the following is $\sqrt{\frac{1}{x}} + \sqrt{\frac{1}{x}}$ equivalent to?

(**A**) $\frac{1}{\sqrt{x}}$ (**B**) $\frac{2\sqrt{x}}{x}$ (**C**) $\frac{1}{2\sqrt{x}}$ (**D**) $\frac{1}{x}$ (**E**) $\frac{2}{x}$

5. Which of the following points is a member of the solution set for the following system?

$$\begin{cases} -3y - 2x > -6 \\ x \le -2 \end{cases}$$

(**A**) $(-3,4)$ (**B**) $(-6,7)$ (**C**) $(-9,8)$ (**D**) $(0,2)$ (**E**) $(-12,9)$

6. Simplify $\frac{6\left(\sqrt{5}\right)^3 - 12\left(\sqrt{5}\right)^5}{6\left(\sqrt{5}\right)^3}$

(**A**) $-12\left(\sqrt{5}\right)^5$ (**B**) $1 - 12\left(\sqrt{5}\right)^5$ (**C**) $1 - 6\left(\sqrt{5}\right)^2$ (**D**) $-11\left(\sqrt{5}\right)^5$ (**E**) -9

7. Which is the largest number?

(**A**) $3\sqrt{5}$ (**B**) $5\sqrt{2}$ (**C**) $4\sqrt{3}$ (**D**) $2\sqrt{11}$ (**E**) 7

8. If $c + d + 1 = 0$ and $(a+b)(c+d)^3 - 9(c+d) + 4 = 0$, find the value of $a + b$?

(**A**) -5 (**B**) 5 (**C**) -13 (**D**) 13 (**E**) $\frac{13}{3}$

9. If $h = g^{-2}j^3$ and $k = g^5h^4j^2$, which of the following is equivalent to *k*?

(**A**) $g^{-3}j^{14}$ (**B**) $g^{-3}j^{15}$ (**C**) $g^{-1}j^{14}$ (**D**) $g^{21}j^{14}$ (**E**) $g^{21}j^{83}$

10. If $\frac{w^4v^5}{u^3} > 0$, which of the following does not have to be positive?

(**A**) $u^9v^7w^2$ (**B**) $w^6v^9u^6$ (**C**) $v^6w^8u^{12}$ (**D**) $w^6v^{11}u^{19}$ (**E**) $w^{10}v^2u^2$

11. If $p + q < r - t < w - v$, and $z < 0$, which of the following must be false?

I. $zr - zt > zp + zq$ II. $zp + zq < zw - zv$ III. $zr - zt > zw - zv$

(**A**) I (**B**) II (**C**) III (**D**) I and II (**E**) II and III

12. If $(w+z)(t+v) = x + y$, then $\frac{w+z}{t+v} =$

(**A**) $\frac{t+v}{x+y}$ (**B**) $\frac{x+y}{t+v}$ (**C**) $\left(\frac{t+v}{x+y}\right)^2$ (**D**) $\frac{(x+y)^2}{t+v}$ (**E**) $\frac{x+y}{(t+v)^2}$

13. $\left(x^{y-3}\right)^{y+3} =$

(**A**) x^{2y} (**B**) x^6 (**C**) x^{y-9} (**D**) x^{y^2-6y-9} (**E**) x^{y^2-9}

14. If $\frac{1}{m}=\frac{1}{3}+\frac{1}{2}$, find *m*.

(**A**) $\frac{1}{5}$ (**B**) $\frac{5}{6}$ (**C**) $\frac{6}{5}$ (**D**) 5 (**E**) 6

15. Which is equivalent to $a+b$ if $a=-3x^2-7x-4$ and $b=4x^2+12x+10$?

(**A**) $(x+2)(x+3)$ (**B**) $(x+6)(x+1)$ (**C**) $(x+3)(x+3)$ (**D**) $(x+2)(x+4)$ (**E**) $(x+2)(x+6)$

16. Solve $\log(6x+23)+\log x-\log 4=0$. You may have more than one answer.

(**A**) -4 (**B**) 4 (**C**) $-\frac{1}{6}$ (**D**) $\frac{1}{6}$ (**E**) 0

17. Write $\frac{(x+1)^2}{2}-\frac{(y-3)^2}{4}=1$ in general form.

(**A**) $2x^2+4x-y^2+6y-8=0$ (**B**) $2x^2+4x-y^2-6y+10=0$ (**C**) $2x^2+4x-y^2+6y-5=0$

(**D**) $2x^2+4x-y^2+6y-11=0$ (**E**) $2x^2+4x-y^2+6y-6=0$

18. Simplify $\frac{\tan^2 x-\sec^2 x}{\cos(-x)}$.

(**A**) $-\csc x$ (**B**) $\csc x$ (**C**) $-\sec x$ (**D**) $\sec x$ (**E**) 0

19. Solve $16\sin^4 x-24\sin^2 x+9=0$ where $x<118^\circ$ or $125^\circ\le x\le 295^\circ$. You may have more than one answer.

(**A**) 30° (**B**) 60° (**C**) 120° (**D**) 210° (**E**) 240°

20. What is the approximate sum of the first 500,000,000 natural numbers?

(**A**) 1.25×10^{17} (**B**) 1.25×10^{16} (**C**) 1.25×10^{15} (**D**) 1.25×10^{14} (**E**) 1.25×10^{13}

21. Which of the following is true?

I. $10{,}000^\circ$ II. 50π radians III. 150 radians

(**A**) I < II < III (**B**) II < I < III (**C**) II < III < I (**D**) III < II < I (**E**) III < I < II

22. What is the area of the figure bounded by $x=-3$, $x=2$, $y+4=-\frac{2}{5}(x-2)$, and $5y-x-13=0$ when graphed on a coordinate plane?

(**A**) 18 (**B**) 20 (**C**) 22 (**D**) 24 (**E**) 27.5

23. Simplify $i^{\ln 1-\ln e-7,482}$.

(**A**) -1 (**B**) 1 (**C**) $-i$ (**D**) i (**E**) $\frac{1}{i}$

24. Write $3x^2+2y^2-24x=12y-60$ in standard form.

(**A**) $\frac{(x-12)^2}{2}+\frac{(y-6)^2}{3}=1$ (**B**) $\frac{(x-4)^2}{2}+\frac{(y-3)^2}{3}=1$ (**C**) $\frac{(x-8)^2}{2}+\frac{(y-6)^2}{3}=1$

(**D**) $\frac{(x-12)^2}{2}+\frac{(y-3)^2}{3}=1$ (**E**) $\frac{(x-8)^2}{2}+\frac{(y-3)^2}{3}=1$

25. For $\left(2m^4-5n^6\right)^5$, what is the third term divided by $2m^2n^{-3}$?

(**A**) $1{,}000m^{10}n^{15}$ (**B**) $100m^{10}n^{15}$ (**C**) $100m^{10}n^9$ (**D**) $1{,}000m^{10}n^9$ (**E**) $100m^5n^{15}$

ADVANCED MATH PRACTICE TEST 4

Name_____ Date_____

Directions: Complete as many problems as you can in the 30 minutes allotted to you. No calculators!

1. $\left[\left(x+y\right)^{\frac{2}{3}}\right]^2 =$

(**A**) $\left(x+y\right)^{\frac{4}{9}}$ (**B**) $\left(x+y\right)^{2\frac{2}{3}}$ (**C**) $\left(x+y\right)^{\frac{4}{3}}$ (**D**) $x^{\frac{4}{3}}+y^{\frac{4}{3}}$ (**E**) $x^{\frac{4}{9}}+y^{\frac{4}{9}}$

2. How much greater is the slope of the line that goes through $\left(2,3\right)$ and $\left(3,7\right)$ than the slope of the line that goes through $\left(2,3\right)$ and $\left(5,4\right)$?

(**A**) $-\frac{3}{2}$ (**B**) $-\frac{2}{3}$ (**C**) $\frac{2}{3}$ (**D**) $\frac{3}{2}$ (**E**) $3\frac{2}{3}$

3. What is the total number of feet in *m* miles, *y* yards, and *f* inches?

(**A**) $1760m+3y+\frac{1}{12}f$ (**B**) $1760m+3y+12f$ (**C**) $5280m+3y+12f$ (**D**) $5280m+3y+\frac{1}{12}f$ (**E**) $m+y+f$

4. When the largest of the three consecutive integers is tripled, it will be 18 less than the smallest integer. Find the product of the smallest and largest.

(**A**) 80 (**B**) 110 (**C**) 120 (**D**) 168 (**E**) does not exist

5. Solve the following system for *y*.

$$\begin{cases} 7x-8y=0 \\ 11x+13y=0 \end{cases}$$

(**A**) 0 (**B**) 1 (**C**) 2 (**D**) 3 (**E**) 4

6. If $4\left(x-2y\right)-2-7\left(x-2y\right)=-4-2\left(x-2y\right)-6$, then $x-2y=$

(**A**) -8 (**B**) 0 (**C**) 8 (**D**) $\frac{8}{5}$ (**E**) undefined

7. What is $lr+lq-pr-pq$ equivalent to?

(**A**) $\left(l-p\right)\left(r+q\right)$ (**B**) $\left(l-r\right)\left(p+q\right)$ (**C**) $\left(l+p\right)\left(r-q\right)$ (**D**) $\left(l-p\right)\left(r-q\right)$ (**E**) $\left(l-p\right)\left(q-r\right)$

8. Solve $\log\left(3x^3+4x^2-12x-15\right)=\ln 1$.

(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 4 (**E**) 5

9. If the area of a triangle is x^2-y^2 and the base is $x+y$, find the height.

(**A**) $x-y$ (**B**) $2\left(x-y\right)$ (**C**) $\frac{x^2-y^2}{x+y}$ (**D**) $\frac{x+y}{x^2-y^2}$ (**E**) $\frac{x-y}{2}$

10. If $3x^2+4y^3-6=0$, then $\frac{1}{4}\sqrt[5]{3x^2+4y^3+26}=$

(**A**) 0 (**B**) $\frac{1}{4}$ (**C**) $\frac{1}{2}$ (**D**) $\frac{3}{4}$ (**E**) 1

11. Solve $\frac{pv}{nt}=r$ for *n*.

(**A**) $\frac{pvt}{r}$ (**B**) $\frac{tr}{pv}$ (**C**) $\frac{pvr}{t}$ (**D**) $\frac{t}{pvr}$ (**E**) $\frac{pv}{tr}$

12. Which ordered pair does not satisfy $y=-x^2+2x-3$?

(**A**) (-1,-6) (**B**) (1,0) (**C**) (-2,-11) (**D**) (2,-3) (**E**) (0,-3)

13. If $a = bc$, then $\frac{b}{c} =$

(A) $\frac{a}{c}$ **(B)** $\frac{a^2}{c}$ **(C)** $\frac{c^2}{a^2}$ **(D)** $\frac{a}{c^2}$ **(E)** $\frac{c}{a}$

14. If $4(x+5)(x-5) = 60$, Find the value of $\frac{2}{3}(x^2 - 25)$.

(A) 8 **(B)** 9 **(C)** 10 **(D)** 12 **(E)** 15

15. A car travels 64 miles for the first hour, 32 miles for the second hour, and 16 miles for the third hour. If the car could decelerate at this rate forever, approximately how many miles would it travel total?

(A) 128 **(B)** 128.2 **(C)** 127.8 **(D)** 128.4 **(E)** 128.6

16. What would be the 90th term given 19, 57, 171, 513, …?

(A) $19 \cdot 3^{91}$ **(B)** $19 \cdot 3^{90}$ **(C)** $19 \cdot 3^{89}$ **(D)** 3^{90} **(E)** 3^{89}

17. A triangle has an angle measuring 62° and its opposite side is 8, and a second side of the triangle is 9. When solving for the length of the third side *x*, what is the value of $9x\cos 62^\circ$?

(A) $\frac{x^2 - 18}{3}$ **(B)** $\frac{x^2 - 17}{3}$ **(C)** $\frac{x^2 + 17}{3}$ **(D)** $\frac{x^2 + 17}{2}$ **(E)** $\frac{x^2 - 17}{2}$

18. The average of three expressions is $-3x^2y^3$. If the first expression is $3x^3y^2 - 6y^3x^2$ and the second is $x^2y^3 - 4y^2x^3$, what is the third expression?

(A) $x^3y^2 - 2x^2y^3$ **(B)** $x^3y^2 + 2x^2y^3$ **(C)** $-4x^2y^3 - 7x^3y^2$ **(D)** $x^3y^2 - 4x^2y^3$ **(E)** $-7x^3y^2 - 2x^2y^3$

19. Simplify $\sqrt{\frac{4^{446} - 4^{445} - 4^{444}}{4^{444} \cdot 44}}$

(A) $\frac{1}{2}$ **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

20. Simplify $\left[\frac{\tan x + \tan y}{\tan(x+y)} + \tan x \tan y - 2\tan 45^\circ - \cos 270^\circ \right]^3$

(A) −8 **(B)** −1 **(C)** 0 **(D)** 1 **(E)** 8

21. If $a^2 = \frac{72 \ln e \cdot \log 1}{\sin 60^\circ + \tan 30^\circ} + \frac{\tan 45^\circ - \cos^2 x}{\cos 180^\circ + 9 - 8\cos x}$, which of the following is equivalent to $\frac{1}{3}a$?

(A) $\frac{1}{3}\sin\frac{x}{2}$ **(B)** $\frac{1}{3}\cos\frac{x}{2}$ **(C)** $\frac{1}{6}\sin\frac{x}{2}$ **(D)** $\frac{1}{6}\cos\frac{x}{2}$ **(E)** $\frac{1}{9}\cos\frac{x}{2}$

22. If $a = \frac{3}{14}\cos\left[\frac{\pi}{2} - (p+r)\right] + \frac{3}{14}\tan(r-p)\cos(r-p)$, which of the following would be equivalent to $\frac{3}{5}a$?

(A) $\frac{9}{35}\cos p \sin r$ **(B)** $\frac{3}{10}\cos p \sin r$ **(C)** $\frac{9}{35}\cos r \sin p$ **(D)** $\frac{3}{7}\cos p \sin r$ **(E)** $\frac{3}{10}\cos r \sin p$

23. $-2\sec^2 x \cos^2 x + 2\cos^2 x + \tan^2 x \cos 2x$ is equivalent to which of the following?

(A) $-\cos^2 x$ **(B)** $\tan^2 x$ **(C)** $-\sin^2 x$ **(D)** $\sin^2 x$ **(E)** $-\tan^2 x$

24. $-\frac{8}{3}\cos\left(\frac{\pi}{2} + a\right)\cos b \tan b + \frac{4}{3}\cos(-a-b)$ is equivalent to which of the following?

(A) $-\frac{4}{3}\cos(a+b)$ **(B)** $\frac{4}{3}\cos(a-b)$ **(C)** $-\frac{4}{3}\cos(a-b)$ **(D)** $-\frac{8}{3}\cos(a-b)$ **(E)** $\frac{8}{3}\cos(a-b)$

25. $2\cos 12^\circ \sin 8^\circ - \sin 20^\circ$ is equivalent to which of the following?

(A) $\sin 6^\circ$ **(B)** $\sin 2^\circ$ **(C)** $\sin 4^\circ$ **(D)** $-\sin 2^\circ$ **(E)** $-\sin 4^\circ$

ADVANCED MATH TEST 1 ANSWERS

1. B	2. D	3. C	4. E	5. C
6. E	7. B	8. C	9. E	10. A
11. D	12. A	13. D	14. A	15. C
16. A	17. B	18. E	19. A	20. A
21. D	22. B	23. B	24. E	25. D

1. $(4,-4) \rightarrow -8-20<-25$

2. $a = b^3b^{12}d^{16}d^{-5} = b^{15}d^{11}$

3. $16a^{6x^3}$

4. $(x-2)^6(x+2)^3(x-2)^{-3}(x-2)^{-2}(x-2)^{-2} = (x-2)(x+2) = x^2-4$

5. $6x-20-(2x-4) = 4x-16$

6. $-10x-24 = -12y \rightarrow m_1 = \frac{5}{6}; -6y-10 = 5x \rightarrow m_2 = -\frac{5}{6} \rightarrow m_1 - m_2 = \frac{5}{3}$

7. $\frac{1}{2} \times -\frac{1}{4} = -\frac{1}{8}$

8. $4 \times \frac{1}{2} = 2$

9. $\frac{2.7^2}{0}$ is undefined

10. $s - \frac{h}{3600}$

11. $\sqrt{\frac{1}{9}+\frac{1}{16}} = \sqrt{\frac{16}{144}+\frac{9}{144}} = \sqrt{\frac{25}{144}} = \frac{5}{12}$

12. $\frac{4l^3+3l^2-7l^3-l-9l^2-11l}{3} = \frac{-3l^3-6l^2-12l}{3} = -l^3-2l^2-4l$

13. $\frac{-3st+3t^2}{3st} = \frac{-s+t}{s} = \frac{t-s}{s}$

14. $\frac{6a-3b-5a+4b}{-4a-2b+b+5a} = \frac{a+b}{\frac{a+b}{a-b}} = \frac{a+b}{1} \cdot \frac{a-b}{a+b} = a-b$

15. $(k-4)^2-(k-9)^2 = k^2-8k+16-k^2+18k-81 = 10k-65$

16. $\frac{8(14\pi-\sqrt{3y})}{32} = \frac{14\pi-\sqrt{3y}}{4} = \frac{16}{3} \cdot \frac{1}{32} = \frac{1}{6}$

17. $\frac{4x+5}{25} = 10^3 \rightarrow 4x+5 = 25,000$

18. $xy-4zx+2y-8z = x(y-4z)+2(y-4z) = (x+2)(y-4z)$. $\therefore$ the ratio of the length to the width is $\frac{x+2}{y-4z}$. If a student did not know how to factor, they could multiply the numerator and denominator of each choice until they arrived at the beginning product.

19. $\frac{6r-4k}{3} = 4 \rightarrow 6r-4k = 12$ $\begin{cases} 3r+4k=8 \\ 6r-4k=12 \end{cases}$ Adding columns yields $9r = 20 \rightarrow r = \frac{20}{9}$. $\therefore \frac{9}{5}r = \frac{9}{5} \cdot \frac{20}{9} = 4$

20. $\frac{2a+2b-2c}{5c+a+b-6c} = \frac{2(a+b-c)}{a+b-c} = 2$

21. When a diameter is doubled, the radius will become two times longer. Therefore $V = \frac{4}{3}\pi(2r)^3 = 8\left(\frac{4}{3}\pi r^3\right)$

22. $h-k-j$

23. $x^{\frac{3}{4}} = \frac{16}{y^{\frac{2}{3}}} = \frac{16}{2} = 8$. Therefore $\frac{1}{x^{\frac{3}{4}}} = \frac{1}{8}$

24. $4a^2 - \frac{3}{a} = \frac{4a^3-3}{a}$

25. $-3k^4-2k^3+4k^2+1-(6k^4-8k^3-10k^2-5) = -9k^4+6k^3+14k^2+6$

ADVANCED MATH TEST 2 ANSWERS

1. C	2. E	3. C	4. A	5. D
6. B	7. A	8. D	9. B	10. D
11. C	12. A	13. E	14. E	15. D
16. C	17. A	18. E	19. E	20. C
21. B	22. E	23. E	24. A	25. A, B, E

1. $\frac{40\%}{x}+\frac{40\%}{x}=80\rightarrow\frac{80\%}{x}=80\rightarrow x=\frac{.80}{80}=0.01$

2. $\left[(x-y)^{0.25}\right]^4=-28.12+7=-21.12\rightarrow\left[(x-y)^{0.25}\right]^4+3=-18.12$

3. $x=-2$. Therefore $\left(\sqrt[3]{-x^2-4x}\right)^3=-(-2)^2-4(-2)=-4+8=4$

4. $u_1w_1v_2=u_2w_2v_1\rightarrow v_2=\frac{u_2v_1w_2}{u_1w_1}$

5. $\frac{1}{v^9}<\frac{1}{v^8}<\frac{1}{v^{10}}$

6. $\frac{(2x-3)(2x+3)}{12}+7=\frac{1}{6}+7=7\frac{1}{6}$

7. $\frac{\left(a^2+c^2\right)^2}{5}=\frac{(e+f-d)^2}{5}$

8. $\frac{-1}{x-3}=\frac{1}{y+2}\rightarrow x-3=-y-2\rightarrow x-1=-y$

9. Let $x=\sqrt[3]{\frac{g+h}{j+k}}$. Therefore

$16-8x=4x-8\rightarrow x=2\rightarrow\sqrt[3]{\frac{g+h}{j+k}}-6=2-6=-4$

10. $\frac{\left(\frac{x^2-x-6}{x-3}\right)^4}{\left(\frac{x^2-3x-10}{x-5}\right)^3}=5\rightarrow\frac{\left(\frac{(x-3)(x+2)}{x-3}\right)^4}{\left(\frac{(x-5)(x+2)}{x-5}\right)^3}=6\rightarrow x+2=6\rightarrow x=4$

11. $\frac{2x^2}{4x^6}=\frac{1}{2x^4}$

12. $x=m^{-4}b^5c^2=m^{-4}b^5\left(m^{-2}b^{-4}\right)^2=m^{-4}b^5m^{-4}b^{-8}=m^{-8}b^{-3}$

13. Simplifying both equations yields $\begin{cases}-d+b=-6\\ d+g=-5\end{cases}$. Now adding columns yields $g+b=-11$. Substituting -11 in for $g+b$ of $\frac{(g+b)^2}{2}$ yields $\frac{11^2}{2}=\frac{121}{2}=60.5$.

14. $\frac{x}{100y}$

15. $\frac{g-3}{5}+4=\frac{g-3}{5}+\frac{20}{5}=\frac{g+17}{5}$

16. $(2t+5)-(t-5)=t+10$

17. $\left(\frac{-7c-23c}{2},\frac{8d-18d}{2}\right)\rightarrow(-15c,-5d)$

18. $\frac{31}{t+2}$

19. $\left(8^{\frac{1}{3}}\right)^x=64^{\frac{5}{6}}\rightarrow\left(2^3\right)^{\frac{1}{3}x}=2^5\rightarrow x=5$ 20. Substituting $-2b-2$ in for $c+d$ of the top equation results in $2b-(-2b-2)=10\rightarrow b=2$. Also, $c+d=-2b-2=-2(2)-2=-6$. Therefore $\frac{b+c+d}{2}=\frac{2+(-6)}{2}=-2$

21. Think of $-4\left(\frac{\sqrt[3]{y+z}}{w}\right)^2+4\left(\frac{\sqrt[3]{y+z}}{w}\right)+48$ as $-4x^2+4x+48$ which factors as $-4\left(x^2-x-12\right)=-4(x-4)(x+3)$. Now substituting back in for x yields $-4\left(\frac{\sqrt[3]{y+z}}{w}-4\right)\left(\frac{\sqrt[3]{y+z}}{w}+3\right)$

22. Solving $4x-y=7$ for y yields $y=4x-7$. Now substituting $4x-7$ in for y of the other equation and simplifying yields $3x-2(4x-7)=4\ \rightarrow\ 3x-8x+14=4$ which is E.

23. $x(x-6)=16\rightarrow x^2-6x-16=0\rightarrow x=8,-2$

24. -1690

25. $\tan^2x-\sec x-1=0\rightarrow(\sec x+1)(\sec x-2)=0\rightarrow\cos x=-1,\ \frac{1}{2}\rightarrow 60^\circ,\ 180^\circ,\ 300^\circ$

ADVANCED MATH TEST 3 ANSWERS

1. B	2. A	3. D	4. B	5. E
6. E	7. B	8. D	9. A	10. B
11. D	12. E	13. E	14. C	15. A
16. D	17. D	18. C	19. B, E	20. A
21. D	22. E	23. D	24. B	25. A

1. $\dfrac{100d}{c}$

2. $\begin{cases} n = d + y \\ 5n + 10d = 100m \end{cases}$

3. $\dfrac{2}{a+b} - \dfrac{2}{b} = \dfrac{2b}{b(a+b)} - \dfrac{2(a+b)}{b(a+b)} = \dfrac{-2a}{b(a+b)} = \dfrac{-2a}{ab+b^2}$

4. $\sqrt{\dfrac{1}{x}} + \sqrt{\dfrac{1}{x}} = \dfrac{1}{\sqrt{x}} + \dfrac{1}{\sqrt{x}} = \dfrac{2}{\sqrt{x}}$

5. $(-12, 9)$

6. $\dfrac{6\left(\sqrt{5}\right)^3 - 12\left(\sqrt{5}\right)^5}{6\left(\sqrt{5}\right)^3} = \dfrac{1 - 2\left(\sqrt{5}\right)^2}{1} = 1 - 10 = -9$

7. $3\sqrt{5} = \sqrt{45}$; $5\sqrt{2} = \sqrt{50}$; $4\sqrt{3} = \sqrt{48}$; $2\sqrt{11} = \sqrt{44}$; $7 = \sqrt{49}$

8. Since $c + d = -1$, then $(a+b)(c+d)^3 - 9(c+d) + 4 = 0 \rightarrow (a+b)(-1) - 9(-1) + 4 = 0 \rightarrow a + b = 13$

9. $h = g^{-2} j^3$ and $k = g^5 h^4 j^2 = g^5 \left(g^{-2} j^3\right)^4 j^2 = g^{-3} j^{14}$

10. u and v must have the same sign. Therefore A, D, C, and E must be positive. B could be negative if u and v are negative.

11. I and II

12. $\dfrac{(w+z)(t+v)}{(t+v)^2} = \dfrac{w+z}{t+v} = \dfrac{x+y}{(t+v)^2}$

13. $\left(x^{y-3}\right)^{y+3} = x^{y^2+3y-3y-9} = x^{y^2-9}$

14. $\dfrac{1}{m} = \dfrac{1}{3} + \dfrac{1}{2} \rightarrow \dfrac{1}{m} = \dfrac{5}{6} \rightarrow m = \dfrac{6}{5}$

15. $-3x^2 - 7x - 4 + 4x^2 + 12x + 10 = x^2 + 5x + 6 = (x+2)(x+3)$

16. $6x^2 + 23x - 4 = 0 \rightarrow x = \dfrac{1}{6}; -4$. Since $x > 0$, therefore $x = \dfrac{1}{6}$.

17. $2(x+1)^2 - (y-3)^2 = 4 \rightarrow 2x^2 + 4x - y^2 + 6y - 11 = 0$

18. $-\dfrac{1}{\cos x} = -\sec x$

19. $\left(4\sin^2 x - 3\right)\left(4\sin^2 x - 3\right) = 0 \rightarrow 4\sin^2 x = 3 \rightarrow \sin x = \pm\dfrac{\sqrt{3}}{2} \rightarrow x = 60^\circ,\ 240^\circ$

20. $(1 + 500,000,000)\,250,000,000 = 1.25 \times 10^{17}$

21. III < II < I

22. 27.5

23. i

24. $\dfrac{(x-4)^2}{2} + \dfrac{(y-3)^2}{3} = 1$

25. $1,000m^{10}n^{15}$

ADVANCED MATH TEST 4 ANSWERS

1. C	2. E	3. D	4. C	5. A
6. C	7. A	8. B	9. B	10. C
11. E	12. B	13. D	14. C	15. A
16. C	17. D	18. D	19. A	20. B
21. D	22. A	23. E	24. B	25. E

1. $\left[\left(x+y\right)^{\frac{2}{3}}\right]^2=\left(x+y\right)^{\frac{4}{3}}$

2. $\frac{7-3}{3-2}-\frac{4-3}{5-2}=4-\frac{1}{3}=3\frac{2}{3}$

3. $5280m+3y+\frac{1}{12}f$

4. $3\left(n+2\right)+18=n\rightarrow n=-12\rightarrow\left(-12\right)\left(-10\right)=120$

5. 0

6. Let $z=x-2y$. $4z-2-7z=-4-2z-6\rightarrow z=8=x-2y$

7. $lr+lq-pr-pq=l\left(r+q\right)-p\left(r+q\right)=\left(l-p\right)\left(r+q\right)$

8. 2

9. $A=\frac{bh}{2}\rightarrow h=\frac{2A}{b}=\frac{2\left(x^2-y^2\right)}{x+y}=2\left(x-y\right)$

10. $\frac{1}{4}\sqrt[5]{3x^2+4y^3+26}=\frac{1}{4}\sqrt[5]{32}=\frac{1}{2}$

11. $nt\left(\frac{pv}{nt}\right)=ntr\ \rightarrow\ pv=ntr\ \rightarrow\ \frac{pv}{tr}=\frac{ntr}{tr}\ \rightarrow\ \frac{pv}{tr}=n$

12. (1,0) is the only point that does not satisfy the equation. $-\left(1\right)^2+2\left(1\right)-3=-1+2-3=-2\neq0$

13. Dividing both sides of the equation by c^2 and simplifying yields $\frac{a}{c^2}$

14. $4\left(x^2-25\right)=60\ \rightarrow\ x^2-25=15\ \rightarrow\ \frac{2}{3}\left(x^2-25\right)=\frac{2}{3}\cdot15=10$

15. $s=\frac{a_1}{1-r}=\frac{64}{1-\frac{1}{2}}=128$

16. $19\cdot3^{89}$

17. $x^2-18x\cos62^\circ+17=0\rightarrow\frac{18x\cos62^\circ}{2}=\frac{x^2+17}{2}$

18. $\frac{\left(3x^3y^2-6y^3x^2\right)+\left(x^2y^3-4y^2x^3\right)+z}{3}=-3x^2y^3\rightarrow\left(3x^3y^2-6y^3x^2\right)+\left(x^2y^3-4y^2x^3\right)+z=-9x^2y^3\rightarrow z=x^3y^2-4x^2y^3$

19. $\sqrt{\frac{4^{444}\cdot11}{4^{444}\cdot44}}=\sqrt{\frac{1}{4}}=\frac{1}{2}$

20. $\left[\frac{\tan x+\tan y}{\frac{\tan x+\tan y}{1-\tan x\tan y}}+\tan x\tan y-2\right]^3=-1^3=-1$

21. $a^2=\frac{1}{4}\cdot\frac{1+cosx}{2}\rightarrow a=\frac{1}{2}\sqrt{\frac{1+\cos x}{2}}=\frac{1}{2}\cos\frac{x}{2}\rightarrow\frac{1}{3}a=\frac{1}{6}\cos\frac{x}{2}$

22. $\frac{3}{14}\left[\sin\left(p+r\right)+\sin\left(r-p\right)\right]=\frac{3}{7}\cdot\frac{1}{2}\left[\sin\left(p+r\right)+\sin\left(r-p\right)\right]=\frac{3}{7}\cos p\cos r\rightarrow\frac{3}{5}\cdot\frac{3}{7}\cos p\sin r\rightarrow\frac{9}{35}\cos p\sin r$

23. $\tan^2x\left(-2\cos^2x+1+\cos2x\right)-\tan^2x=2\tan^2x\left(\frac{-2\cos^2x}{2}+\frac{1+\cos2x}{2}\right)-\tan^2x=-\tan^2x$

24. $\frac{8}{3}\cdot\frac{1}{2}\left[\cos\left(a-b\right)-\cos\left(a+b\right)\right]+\frac{4}{3}\cos\left(a+b\right)=\frac{4}{3}\cos\left(a-b\right)$

25. $2\cos12\sin8-\sin20=\sin20-\sin4-\sin20=-\sin4^\circ$