Aeuplacer
Arithmetic Sample Questions

1) $2.75 + 0.003 + 0.158 =$

2.75
0.003
0.158
2.911 — line up the decimals

2.) $7.86 \times 4.6 =$

7.86
4.6
4716 — multiply by the 6
3144 — multiply by the 4 lined up under the 4
36.156 — Add the two numbers
Count the number of decimal places (3)

3.) $\frac{7}{20} =$

$20\overline{)7.00}$ 0.35 — add a decimal and a zero
60
100 — add another zero and bring it down
100
0

4.) Which of the following is the least

A. 0.105
B. 0.501
C. 0.015
D. 0.15

There is not a value in the ones place
check the tenth place
The smallest value in the tenth place is zero
so that is the least number.

5) All of the following are ways to write 25 percent of N

25 percent can be written as 0.25, $\frac{25}{100}$, $\frac{1}{4}$. the (of) means to multiply

so $0.25N$, $\frac{25}{100}N$, and $\frac{1}{4}N$ are all correct

then 25N is not correct but is the correct answer.

6.) Which of the following is closest to 27.8×9.6

on the calculator $27.8 \times 9.6 = 266.88$
rounding up to 267
280 is the lowest number in the list so 280 is the answer.

7.) The team won 65% of 160 games

so convert % to a decimal

$.65 \times 160 = 104$

8.) 3 people work on a project
total time must = 1 person full time
1 person is budgeted for ½ of his time
1 person is budgeted for ⅓ of her time
What is the 3rd persons time for the project?

$\frac{1}{2} + \frac{1}{3} + x = 1$ need a common denominator.

$\frac{3}{6} + \frac{2}{6} + x = 1$

$\frac{5}{6} + x = 1$

$-\frac{5}{6} \quad -\frac{5}{6}$

$x = 1 - \frac{5}{6}$

$= \frac{6}{6} - \frac{5}{6}$

$= \frac{1}{6}$

9.) 32 is 40% of what number
'is' means '='

$\frac{32}{.4} = \frac{.4(x)}{.4}$ % to decimal and multiply by the unknown; divide both sides by .4

$80 = x$

10.) $3\frac{1}{3} - 2\frac{2}{5} =$

$3\frac{1}{3} = 2\frac{5}{15} = 2\frac{15}{15} + \frac{5}{15} = 2\frac{20}{15}$

$-2\frac{2}{5} = -2\frac{6}{15} = -2\frac{6}{15} = -2\frac{6}{15}$

Borrow 1 from 3

$\frac{14}{15}$

11.) $2\frac{1}{2} + 4\frac{2}{3}$ #10 can also be worked this way
#11 can be done like #10

$= \frac{5}{2} + \frac{14}{3}$

$= \frac{15}{6} + \frac{28}{6}$

$= \frac{43}{6} \qquad 6\overline{)43} \quad 7$ remainder 1 $= 7\frac{1}{6}$

12.) What is $\frac{1345}{99}$ rounded to the nearest integer (whole number)

using calculator

$\frac{1345}{99} = 13.585858\ldots$ rounds up to 14

13) Three of four numbers have a sum of 22. If the average of the four numbers is 8, what is the fourth number.

$\frac{a+b+c+x}{4} = 8$ Let x be the fourth number

$a+b+c = 22$

$(4)\frac{22+x}{4} = 8(4)$ multiply both sides by 4

$22+x = 32$

$-22 \quad -22$ subtract 22 from both sides.

$x = 10$

14) $46.2 \times 10^{-2} =$

the -2 means move the decimal 2 places to the left (neg. direction)

0.462

additional info

if we had 46.2×10^{2}

the pos 2 means move the decimal 2 places to the right.

4620

15) $\frac{3}{2} \div \frac{1}{4} = n$ n is between ?

$\frac{3}{2} \div \frac{1}{4} = \frac{3}{2_1} \cdot \frac{4^2}{1} = 6$ is between 5 and 7

multiply by the reciprocal of the divisor reduce then multiply.

16. What is 12% of 120

$x = .12(120)$

$x = 14.4$

17.) is the same concept as # 8

$\frac{1}{3} + \frac{1}{6} + x = 1$

common denominator is 6

$\frac{2}{6} + \frac{1}{6} + x = 1$

$\frac{3}{6} + x = 1$ combine like terms and reduce

$\frac{1}{2} + x = 1$

$-\frac{1}{2} \quad -\frac{1}{2}$ subtract $\frac{1}{2}$ from both sides

$x = \frac{2}{2} - \frac{1}{2}$ change 1 to a fraction $\frac{2}{2}$

$x = \frac{1}{2}$ subtract the numerators.

18.) The measure of two angles of a triangle are 35° and 45°. What is the measure of the third angle?

A triangle has 180°

so $180-(35+45)$

$= 180-80$

$= 100°$

19.) She bought $3\frac{1}{2}$ yds. She used 2/3 of the $3\frac{1}{2}$ yds. How much is left.

$\frac{2}{3}$ of $3\frac{1}{2}$ change $3\frac{1}{2}$ to an improper fraction

$\frac{2^{1}}{3} \cdot \frac{7}{2_{1}} = \frac{7}{3}$ reduce and multiply

so $\frac{7}{3}$ yds is what she used (or $2\frac{1}{3}$ yds)

$\frac{7}{2} - \frac{7}{3}$ subtract 7/3 from the $3\frac{1}{2}$ or 7/2 yds find a common denominator

$= \frac{21}{6} - \frac{14}{6}$

$= \frac{7}{6}$ yds left. or $1\frac{1}{6}$ yds.

20.) floor is 12ft by 8ft. it cost \$2.50 per sq. ft. what is the cost.

The area of the floor is $LW = 12(8) = 96\ ft^2$

$96 \cdot \$2.50 = \$240.00$

Elementary Algebra

1.) A is the number of apples purchased at 15 cents ea.
B is the number of bananas purchased at 10 cents ea.
What is the equation for the total cost in cents

this is a trick word.

$15A + 10B$ because it said in cents not dollars.

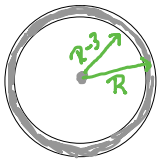
2.) $\sqrt{2} \times \sqrt{15} =$

$\sqrt{2} \times \sqrt{15} = \sqrt{2 \times 15} = \sqrt{30}$

3.) $2x^2+3xy-4y^2$, $x=2$, $y=-4$

$2(2)^2+3(2)(-4)-4(-4)^2$
$= 2(4)+(-24)-4(16)$
$= 8-24-64 \quad = -80$

4.)



What is the equation for the area of the shaded region

The area of a circle is $A=\pi r^2$
We need to subtract the area of the smaller circle from the area of the larger circle.

Then we have
$A=\pi R^2-\pi(R-3)^2$

5.) $(3x-2y)^2$

$(3x-2y)(3x-2y)$

$= 3x(3x)-3x(2y)-2y(3x)+2y(2y)$

$= 9x^2-6xy-6xy+4y^2$

$= 9x^2-12xy+4y^2$

6.) $\frac{x^2-x-6}{x^2-4}$

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

factor

difference of squares

7.) $\frac{4-(-6)}{-5}$

$\frac{4-(-6)}{-5} = \frac{4+6}{-5} = \frac{10}{-5} = -2$

8.) $2x-3(x+4)=-5$ solve for x

$2x-3(x+4)=-5$ distribute -3
$2x-3x-12=-5$ combine like terms
$-x-12=-5$
$+12 \quad +12$ add 12 to both sides
$(-1)-x = 7(-1)$ multiply by (-1) on both sides (need x to be positive)
$x=-7$

9) $-3(5-6)-4(2-3)$

$-3(5-6)-4(2-3)$

$= -15+18-8+12$

$= 7$

10) $20-\frac{4}{5}x \geq 16$

$20-\frac{4}{5}x \geq 16$

$-20 \qquad -20$

$\left(\frac{-5}{4}\right)-\frac{4}{5}x \geq -4\left(\frac{-5}{4}\right)$

multiplying by a neg. flips the sign

$x \leq 5$

number line

$(-\infty, 5]$

interval notation

11) order least to greatest

$-\frac{1}{3}, -\frac{3}{5}, \frac{2}{3}, \frac{3}{5}$

Find a common denominator

$-\frac{1}{3}$	$-\frac{3}{5}$	$\frac{2}{3}$	$\frac{3}{5}$
$\frac{-5}{15}$	$\frac{-9}{15}$	$\frac{10}{15}$	$\frac{9}{15}$

order 2 1 4 3

$-\frac{3}{5}, -\frac{1}{3}, \frac{3}{5}, \frac{2}{3}$

12) $5t+2=6$ solve for t

$5t+2=6$

$-2 \quad -2$ subtract 2 from both sides

$\frac{5t}{5} = \frac{4}{5}$ divide both sides by 5

$t = \frac{4}{5}$

13) For which is $x=5$ and $x=-5$ both a solution

B. $x^2-25=0$

$5^2-25=0$ ✓ $\quad (-5)^2-25=0$

$25-25=0$ ✓ $\quad 25-25=0$ ✓

Why the others are not correct.

A) $5^2+25=(-5)^2+25=25+25=50\neq 0$

C) $5^2+10(5)-25=25+50-25=50\neq 0$

$(-5)^2+10(-5)-25=25-50-25=-50\neq 0$

D) $5^2-5(5)-25=25-25-25=-25\neq 0$

$(-5)^2-5(-5)-25=25+25-25=25\neq 0$

14) $\frac{4}{x}+\frac{54}{x}-\frac{4}{5x}=$

$\frac{4}{x}+\frac{54}{x}-\frac{4}{5x}$

$=\frac{54}{5x}+\frac{254}{5x}-\frac{4}{5x}$

$=\frac{304-4}{5x}$

$=\frac{294}{5x}$

15.)

Which of the following inequalities is graphed on the number line

The number line says $x\leq 2$

since none of the inequalities have a neg coefficient in front of x we know that the inequality symbol will not flip.
so we can eliminate A and D

B) $2x+5\leq 6 \Rightarrow 2x\leq 1 \Rightarrow x\leq \frac{1}{2}$ ✗

C) $3x-1\leq 5 \Rightarrow 3x\leq 6 \Rightarrow x\leq 2$ ✓

16) $2x+6y=5$
$x+3y=2$
How many solutions (x,y) are there to the system of equations above?

$2x+6y=5 \Rightarrow 6y=-2x+5 \Rightarrow y=-\frac{1}{3}x+\frac{5}{6}$

$x+3y=2 \Rightarrow 3y=-x+2 \Rightarrow y=-\frac{1}{3}x+\frac{2}{3}$

so the lines have the same slope but different y-intercepts.
so the lines are parallel and there is no solution

17.) Which of the follow is a factor of both x^2-x-6 and x^2-5x+6

x^2-x-6 $\quad$ x^2-5x+6
$(x+2)(x-3)$ $\quad$ $(x-2)(x-3)$

so $(x-3)$ is a factor of both

18) $\frac{10x^6+8x^4}{2x^2}=$

$\frac{10x^6}{2x^2}+\frac{8x^4}{2x^2}$

$=5x^{6-2}+4x^{4-2}$
$=5x^4+4x^2$

19) yard is $96ft^2$, width is 4ft less than the length
What is the perimeter?

$A=LW$ and $W=L-4$
then $A=L(L-4)$
$96=L^2-4L$
$0=L^2-4L-96$ Factor

We need the factors of 96 whose difference is 4

96
/ \
1 96
2 48
3 32
4 24
6 16
8 12

$L^2-4L-96$
$(L+8)(L-12)$ $\quad -12+8=-4$
$L=-8$ $\quad L=12$

$W=L-4=12-4=8$
$L=12$
$W=8$
$P=2W+2L=2(8)+2(12)=16+24=40$

20) Mon, 3hrs to do Exercises
Tues, 2hrs to do same number of Exercises

Monday's average rate was P exercises per hr.
What was Tues' average rate.

Let E represent the number of exercises each day
then

① $\frac{E}{3hr} = \frac{P}{hr}$ cross multiply

$Ehr = 3Phr$ the hr cancels
$E = 3P$

② $\frac{E}{2hr} = \frac{3P}{2hr} = \frac{3}{2} P/h$ Replace E with 3P

College Level

1) $2^{\frac{5}{2}} - 2^{\frac{3}{2}}$

rewrite $\sqrt{2^5} - \sqrt{2^3}$ we need the same thing under both radicals

$= \sqrt{2^3 \cdot 2^2} - \sqrt{2^3}$

$= 2\sqrt{2^3} - \sqrt{2^3}$

$= \sqrt{2^3}$
$= 2^{\frac{3}{2}}$

2.) $\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$ solve for x

$\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$ common denominator is xab

$\frac{xab}{x} + \frac{xab}{a} = \frac{xab}{b}$ multiply every term by xab

$ab + xb = xa$
$-xb \quad -xb$ subtract xb from both sides
we want all x's on the same side

$ab = xa - xb$
$\frac{ab}{a-b} = \frac{x(a-b)}{a-b}$ factor out the x
then divide by (a-b)
$\frac{ab}{a-b} = x$

3.) if $3x^2-2x+7=0$ then $(x-\frac{1}{3})^2=?$

Complete the square

$3x^2-2x+7=0$

$3(x^2-\frac{2}{3}x+\_\_)=-7+3(\_\_)$

$(\frac{b}{2})^2$ $\frac{2}{3}\cdot\frac{1}{2}=\frac{1}{3}$ $(\frac{b}{2})^2$

$3(x^2-\frac{2}{3}x+(\frac{1}{3})^2)=-7+3(\frac{1}{3})^2$

$3(x-\frac{1}{3})^2 = -7+3\cdot\frac{1}{9}$

$3(x-\frac{1}{3})^2 = -7+\frac{1}{3}$

$= -\frac{21}{3}+\frac{1}{3}$

$\frac{3(x-\frac{1}{3})^2}{3} = -\frac{\frac{20}{3}}{3}$

$(x-\frac{1}{3})^2 = -\frac{20}{9}$

4.) Which is parallel to $2x$

✗ A) $4x-y=4$ has slope 4 front of y

✗ B.) $2x-2y=2$ has slope 1

✓ C.) $2x-y=4$ has slope 2, y-int. $=-4$

✗ D.) $2x+y=2$ has slope -2

✗ E.) $x-2y=4$ has slope $-\frac{1}{2}$

5.) An equation of the line that contains the origin and the point $(1,2)$

A and B would contain the origin
C, D and E can be eliminated because they have y-int. other than 0.

A) $y=2(1)=2$ ✓

B) $2y=1 \Rightarrow y=\frac{1}{2}$ ✗

6.) 12 units, one- and two- bedroom rent for $360 and $450 per month. When all units are rented the total monthly rental is $4,950. How many two bedrooms are there.

Let x be one bedroom
and y be two bedrooms

then $360x + 450y = 4950$
and $x + y = 12$

$y = 12 - x$

$360x + 450(12 - x) = 4950$
$360x + 5400 - 450x = 4950$
$-5400 \qquad -5400$
$\frac{-90x}{-90} = \frac{-450}{-90}$
$x = 5$
$y = 12 - 5 = 7$

there are 7 2-bedroom units

7) 

Note the regions are square

How much fencing is needed?

$A = s^2$
$125 = s_1^2 \quad 5 = s_2^2$
$\sqrt{125} = s_1 \quad \sqrt{5} = s_2$
$5\sqrt{5} = s_1 \quad \sqrt{5} = s_2$

$P = 4s_1 + 4s_2$
$= (4)5\sqrt{5} + (4)\sqrt{5}$
$= 20\sqrt{5} + 4\sqrt{5}$
$= 24\sqrt{5}$

8.) $\log_{10} x = 3$, $x = ?$

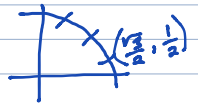
$10^3 = x$
$1000 = x$

9.) $f(x) = 2x + 1$, $g(x) = \frac{x-1}{2}$

Find $f(g(x))$

$f(g(x)) = 2\left(\frac{x-1}{2}\right) + 1 = x - 1 + 1 = x$

10) $\sin\theta = \frac{1}{2}$ then $\cos\theta = ?$



$\cos\theta = \frac{\sqrt{3}}{2}$

11.) $5y(2y-3)+1(2y-3) =$

$(5y+1)(2y-3)$ factor out $(2y-3)$ and what is left?

12.) $x^2-6x+9 < 0$

$(x-3)(x-3)$

$(x-3)^2$

$x = 3$

$+$ 0 | $+$ 4

3

The equation is never < 0

13) $x^2-5x-1=0$ solve for x

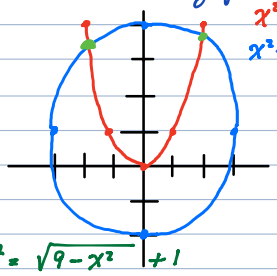
can't be factored

so $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$\frac{-(-5) \pm \sqrt{5^2-4(1)(-1)}}{2(1)}$

$\frac{5 \pm \sqrt{29}}{2}$

14) $y = x^2$, circle with center $(0,1)$ and $r=3$ have how many points of intersection



so there are 2 points of intersection

$x^2+(y-1)^2 = 9 \Rightarrow y = \pm\sqrt{9-x^2}+1$

$y = x^2$

$x = \pm 1.936377$ $y = 3.7502813$ using a calculator

by hand $x^2 = \sqrt{9-x^2}+1$

$x^2-1 = \sqrt{9-x^2}$

$(x^2-1)^2 = 9-x^2$

$x^4-2x^2+1-9+x^2 = 0$

$x^4-x^2-8=0$ $\quad w = x^2$

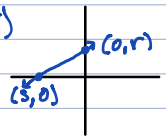
$w^2-w-8=0$

$\frac{+1 \pm \sqrt{1-4(-8)}}{2} = \frac{1 \pm \sqrt{33}}{2}$

$x^2 = \frac{1 \pm \sqrt{33}}{2}$ $\quad x = \pm\sqrt{\frac{1 \pm \sqrt{33}}{2}}$

$x = \sqrt{\frac{1+\sqrt{33}}{2}}$ $\quad x = -\sqrt{\frac{1+\sqrt{33}}{2}}$

$x = \sqrt{\frac{1-\sqrt{33}}{2}}$ and $x = -\sqrt{\frac{1-\sqrt{33}}{2}}$ are non real answers

15) 

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$\frac{r-0}{0-s} = \frac{r}{-s} = -\frac{r}{s}$

16.) T, U, V, W What is the total number of orderings from left to right?

$4! = 24$

TUVW	UTVW	VTUW	WTUV	$6 \times 4 = 24$
TUWV	UTWV	VTWU	WTVU	
TVUW	UVTW	VUTW	WVTU	
TVWU	UVWT	VUWT	WVUT	
TWUV	UWVT	VWUT	WUVT	
TWVU	UWTV	VWTU	WUTV	

17.) $f(x) = \frac{3x-1}{2}$ what is $f^{-1}(3)$

Find $f^{-1}(x)$

$x = \frac{3y-1}{2}$

$\frac{2x+1}{3} = y^{-1}$ $\quad f^{-1}(3) = \frac{2(3)+1}{3} = \frac{7}{3}$

18.) The sequence $\{a_n\}$ is defined by $a_0 = 1$ and $a_{n+1} = 2a_n + 2$ for $n = 0, 1, 2, \ldots$
What is the value of a_3

$a_0 = 1$
$a_1 = a_{0+1} = 2a_0 + 2 = 2(1) + 2 = 4$
$a_2 = a_{1+1} = 2a_1 + 2 = 2(4) + 2 = 10$
$a_3 = a_{2+1} = 2a_2 + 2 = 2(10) + 2 = 22$

19.) From 5 emps. a group of 3 will be chosen
How many different groups of 3 can be chosen?

5 choose 3 order does not matter.

$nCr = \frac{n!}{(n-r)!r!}$

$\frac{5!}{(5-3)!(3!)} = \frac{120}{2(6)} = \frac{120}{12} = 10$

20.) If $f(x) = (\frac{1}{3})^x$ and $a < b$ which of the following must be true?

A. The problem does not give enough info

B. The problem does not give enough info

C. Can't happen if $a < b$

so A, B, & C are eliminated
now since $\frac{1}{3^a} > \frac{1}{3^b}$ because the larger the denominator the smaller the number
E has to be our answer