## PURDUE Indiana Academic 22nd Annual M.A.T.H. Bowl <br> 

Invitational January 22 - Feb. 3, 2018

> Begin
> Practice Round

$$
3(4)=?
$$

A. 34
B. 7
C. -1
D. 12

2018 MATH Invitational Practice Round

$$
3(4)=?
$$

$$
\text { D. } 12
$$





## The first modern Olympics were held in 1896. How many years ago was that?



2018 MATH Invitational Round 1 Number 1

## The first modern Olympics were held in 1896. How many years ago was that?

## B. 122

2018
-1896
122

## Which number is a prime number?

A. 2017<br>B. 2018<br>C. 2019<br>D. 2020<br>PRIME NUMBERS<br>1 2 34 4 5 78 810<br><br>21222324252627282930<br>313233343536 337 383940<br>4424344454647484950<br>54 52<br>하 6263646566 65 686970<br>귱727374757677787980<br>8182 838485868788 8999<br>949293949598 囘 98 99 kc

2018 MATH Invitational Round 1 Number 2

## Which number is a prime number?

## A. 2017

B. 2018 - divisible by 2
C. 2019 - divisible by 3
D. 2020 - divisible by 2


If this were not multiple choice, one would need to check whether 2017 is divisible by 2 ,
$3,5,7,11,13,17,19,23,29$,
31, 37, 41, and 43 to confirm.

A lemonade stand sells a 10 ounce drink for $\$ 1$. If the price is directly proportional to the amount of drink served, what is the price of a 16 ounce drink?

A. $\$ 1.25$
B. $\$ 1.50$
C. $\$ 1.60$
D. $\$ 1.75$

2018 MATH Invitational Round 1 Number 3

## A lemonade stand sells a 10 ounce drink for $\$ 1$. If the price is directly proportional to the amount of drink served, what is the price of a 16 ounce drink?


C. $\$ 1.60$

10 ounces for $\$ 1.00$ gives $\$ 0.10 /$ ounce
So, 16 ounces will cost $16(\$ 0.10$ ) or $\$ 1.60$.

Bill's heart rate, when sitting, beats at a rate of 50 beats per min. When he runs, his heart rate jumps to 160 beats per min. What is the percent of increase in Bill's heartbeat when he runs?
A. $200 \%$
B. $210 \%$
C. $215 \%$
D. $220 \%$


2018 MATH Invitational Round 1 Number 4
Bill's heart rate, when sitting, beats at a rate of 50 beats per min. When he runs, his heart rate jumps to 160 beats per min. What is the percent of increase in Bill's heartbeat when he runs?

> D. $220 \%$
> $\frac{160-50}{50}=\frac{x}{100}$
> $\frac{110}{50}=\frac{x}{100}$
$X=220$


Dave drove his car on the interstate at 70 mph the same number of hours that Doug drove his car at 55 mph . If Dave ended up driving 105 more miles than Doug, how many hours did they each drive?
A. 5
B. 6
C. 7
D. 8


2018 MATH Invitational Round 1 Number 5
Dave drove his car on the interstate at 70 mph the same number of hours that Doug drove his car at 55 mph . If Dave ended up driving 105 more miles than Doug, how many hours did they each drive?
C. 7
Use D = RT
Let $T=$ number of hours each drove
Dave drove 70T and Doug drove 55T

Dave drove 105 more miles than Doug

$$
70 T=105+55 T
$$

$70 \mathrm{~T}-55 \mathrm{~T}=105+55 \mathrm{~T}-55 \mathrm{~T}$
$15 \mathrm{~T}=105$
$(15 T) / 15=105 / 15$
$\mathrm{T}=7$
$2 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5=10^{K}$
A. $K=9$
B. $K=5$
C. $K=6$
D. $K=7$


2018 MATH Invitational Round 1 Number 6

## What is the value of $K$ in the equation shown?

$2 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5=10^{K}$

## C. $\mathrm{K}=6$

$2 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5=$ $2 \cdot(2 \cdot 2) \cdot(2 \cdot 2 \cdot 2) \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

We see six factors of $(2 \cdot 5)$ or 10
$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$ or $10^{6}$
Or a calculator gives $2 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5=1,000,000$ Which is $10^{6}$ in scientific notation.

Darla took a 92 mile trip and used 6 gallons of gas. If the gas in her car is consumed at the same rate, choose the best estimate of the number of gallons her car would use on a 258 mile trip?
A. 2.1
B. 15.4
C. 16.8
D. 20


2018 MATH Invitational Round 1 Number 7

## Darla took a 92 mile trip and used 6 gallons of

 gas. If the gas in her car is consumed at the same rate, choose the best estimate of the number of gallons her car would use on a 258 mile trip?C. 16.8<br>92 miles $=258$ miles<br>6 gallons $x$ gallons<br>$$
92 x=6(258)
$$<br>$$
92 x=1548
$$<br>$$
(92 x) / 92=1549 / 92
$$<br>$$
x \approx 16.82608696 \ldots
$$<br>$$
\text { So } x \text { is about } 16.8 \text { gallons }
$$

Stem and Leaf Plot leaf plot to identify
TENS ONES
$9 \quad 011$
8469
$7 \quad 89$
$7 \mid 8$ means 78

Use the stem and the mean, mode, and range respectively.
A. $12,86,91$
B. $88,89,0$
C. $88,9,12$
D. $86,91,13$

2018 MATH Invitational Round 1 Number 8

Stem and Leaf Plot
TENS ONES

| 9 | 0 | 1 | 1 |
| :--- | :--- | :--- | :--- |
| 8 | 4 | 6 | 9 |
| 7 | 8 | 9 |  |

7 | 8 means 78

Use the stem and leaf plot to identify the mean, mode, and range respectively.
D. $86,91,13$

Data items are 78, 79, 84, 86, 89, 90, 91, 91.
The mode is 91 , eliminating $B$ and $C$ as answer choices.
The range is $91-78=13$, which is the third part of the answer. The mean is $688 / 8=86$.

## End

Round One

## Begin

Round Two

## The model represents which fact?


A. $2 / 3(3 / 4)=1 / 2$
B. $2 / 3+3 / 4=6 / 12$
C. $1 / 3(1 / 4)=2 / 12$
D. $3 / 4-2 / 3=5 / 12$

2018 MATH Invitational Round 2 Number 1

## The model represents which fact?



## A. $2 / 3(3 / 4)=1 / 2$

Along the top, $2 / 3$ is colored blue.
Along the side, $3 / 4$ is colored yellow.
The overlap is colored green.
This represents the fact that $2 / 3$ times $3 / 4$ is $6 / 12$, which simplifies to $1 / 2$.
The other choices were not facts as the math was incorrect.

Which expression is not the same as the other three?

$$
\begin{aligned}
& \text { A. } 4 x+3 \\
& \text { B. } 7 x-3 x+2(1+1) \\
& \text { C. }(8 x+6) / 2 \\
& \text { D. } 4(x+1)-1
\end{aligned}
$$

2018 MATH Invitational Round 2 Number 2

## Which expression is not the same as the other three?

$$
\text { B. } 7 x-3 x+2(1+1)
$$

The distributive property tells us
$(8 x+6) / 2$ and $4(x+1)-1$ both simplify to $4 \mathrm{x}+3$.

$$
\begin{aligned}
& 7 x-3 x+2(1+1) \text { simplifies to } \\
& 4 x+4
\end{aligned}
$$

Taylor has 12 packages of sports trading cards. Each package has a dozen cards. If Taylor gives half of the cards to Kate, how many cards will each person have?

A. 36<br>B. 72<br>C. 144<br>D. 163



2018 MATH Invitational Round 2 Number 3
Taylor has 12 packages of sports trading cards. Each package has a dozen cards. If Taylor gives half of the cards to Kate, how many cards will each person have?
B. 72

Half of 12 packs is 6 packs.
A dozen is 12.
$12(6)=72$ cards.


Find X .

B. 95
C. 105
D. 72

2018 MATH Invitational Round 2 Number 4
Find X .


## C. 105

This is an example of Pascal's Triangle where each number is the sum of the two numbers below.
$60+45=105$ Input-Output table?

| Input x | 1 | 3 | 6 | 9 | 12 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Output y | 2 | -2 | -8 | -14 | -20 |

$$
\begin{aligned}
& \text { A. } y=-2(x+2) \\
& \text { B. } y=-2 x+4 \\
& \text { C. } y=-2 x+(-4) \\
& \text { D. } y=-2 x-4
\end{aligned}
$$

2018 MATH Invitational Round 2 Number 5

## Which equation represents a function for the Input-Output table?

| Input x | 1 | 3 | 6 | 9 | 12 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Output y | 2 | -2 | -8 | -14 | -20 |

Check $x=1, y=2$ in each equation.
B. $y=-2 x+4$
$2=-2(1+2) \quad 2 \neq-6 x$
$2=-2(1)+4 \quad 2=2 \quad \boldsymbol{v}$
$2=-2(1)+(-) 4 \quad 2$ I 6
$2=-2(1)-4 \quad 2 \neq-6 *$
To confirm, check the other ( $\mathrm{x}, \mathrm{y}$ )
values in $y=-2 x+4$.

Lynn's horse weighs 74 pounds more than 5 times Lynn's weight. Lynn and her horse weigh a total of 710 pounds. How much does the horse weigh, in pounds?

A. 579<br>B. 604<br>C. 635<br>D. 869



2018 MATH Invitational Round 2 Number 6
Lynn's horse weighs 74 pounds more than 5 times Lynn's weight. Lynn and her horse weigh a total of 710 pounds. How much does the horse weigh, in pounds?

Let $\mathrm{x}=$ Lynn's weight
$74+5 x=$ horse's weight
B. 604

$$
\begin{aligned}
& x+74+5 x=710 \\
& 6 x+74=710 \\
& 6 x+74-74=710-74 \\
& 6 x=636 \\
& (6 x) / 6=636 / 6 \\
& x=106
\end{aligned}
$$


$710-106=604$

Levi wants to visit his aunt for her birthday. She lives 673.75 miles away. He drives an average speed of 55 mph . If he wants to arrive at 7:00 p.m., what time should he start his trip?
A. $6: 30$ a.m.
B. 6:35 a.m.
C. 6:40 a.m.
D. 6:45 a.m.


2018 MATH Invitational Round 2 Number 7
Levi wants to visit his aunt for her birthday. She lives 673.75 miles away. He drives an average speed of 55 mph . If he wants to arrive at 7:00 p.m., what time should he start his trip?
D. 6:45 a.m.
$\mathrm{D}=\mathrm{RT}$
$673.75=55 \mathrm{~T}$
$673.75 \div 55=55 \mathrm{~T} \div 55$
$\mathrm{T}=12.25$ hours
Or 12 hours 15 minutes
12 hours before 7:00 p.m. is 7:00 a.m.
So Levi needs to start 15
minutes before 7

A scientist noticed a virus population tripled every 10 minutes. If a petri dish is completely full after 7 hours, how long did it take the dish to be $1 / 3$ full?
A. 5 hours 40 min
B. 5 hours 50 min
C. 6 hours 40 min
D. 6 hours 50 min


2018 MATH Invitational Round 2 Number 8
A scientist noticed a virus population tripled every 10 minutes. If a petri dish is completely full after 7 hours, how long did it take the dish to be 1/3 full?
D. 6 hours 50 min


If the dish is $1 / 3$ full, and triples in next 10 minutes, then it will be full. Since it is full at 7 hours, it must have been $1 / 3$ full 10 minutes earlier or at 6 hours 50 minutes.

## End

Round Two

## Begin

Round

## Three

Which is NOT an example of the commutative property for real numbers?

$$
\begin{aligned}
& \text { A. } 3(7)=7(3) \\
& \text { B. } 4+9=9+4 \\
& \text { C. } 7 \div 3=7 / 3 \\
& \text { D. } 8+(-4)=-4+8
\end{aligned}
$$

2018 MATH Invitational Round 3 Number 1

# Which is NOT an example of the commutative property for real numbers? 

$$
\text { C. } 7 \div 3=7 / 3
$$

Addition and multiplication are commutative.
Changing the order does not change the result.
Division is NOT commutative.

## Travis sold 30 more than 4 times 6 raffle tickets. How many raffle tickets did he sell?

A. 50
B. 24
C. 120
D. 54


2018 MATH Invitational Round 3 Number 2

## Travis sold 30 more than 4 times 6 raffle tickets. How many raffle tickets did he sell?

D. 54
$30+4(6)$
$30+24$
54

Which answer choice does NOT contain equivalent values?

DECIMAL FRACTION PERCENT
A
0.8
4/5
80\%
B
0.38
19/50
38\%
C
0.12
3/25
12\%
D
0.56
14/26
56\%

2018 MATH Invitational Round 3 Number 3

## Which answer choice does NOT contain equivalent values?

## DECIMAL FRACTION PERCENT <br> 14/26 56\%

$0.56=56 / 100$ reduces to $14 / 25$

Given the sequence $3,9,15,21, \ldots$ what is the $25^{\text {th }}$ term?
A. 147
B. 150
C. 153
D. 156

2018 MATH Invitational Round 3 Number 4

## Given the sequence $3,9,15,21, \ldots$ what is the $25^{\text {th }}$ term?

The sequence starts with 3 and 6 is added repeatedly.
$3=3+6(1-1)$
A. 147 $9=3+6(2-1)$
$15=3+6(3-1)$
$21=3+6(4-1)$
It is defined by the expression $3+6(n-1)$ for integer values of $n$ starting at 1 .

$$
\begin{aligned}
25 \text { th term } & =3+6(25-1) \\
& =3+6(24) \\
& =3+144 \\
& =147
\end{aligned}
$$

## If you take 5 away from 4 times a number, you would get 235 . What is the number?

A. 30
B. 40
C. 50
D. 60

2018 MATH Invitational Round 3 Number 5

## If you take 5 away from 4 times a number, you would get 235 . What is the number?

$$
\begin{aligned}
& \text { Let } \mathrm{n}=\text { the number } \\
& 4 n-5=235 \\
& 4 n-5+5=235+5 \\
& 4 n=240 \\
& (4 n) / 4=240 / 4 \\
& n=60
\end{aligned}
$$

Or check each possible answer: 4(30) $-5=235$
$120-5 \neq 235 *$
B. $4(40)-5=235$ $160-5 \neq 235$ *
C. $4(50)-5=235$ $200-5 \neq 235 *$
D. $4(60)-5=235$
$240-5=235 \checkmark$

2018 MATH Invitational Round 3 Number 645 seconds
The ratio of boys to girls in the 5th grade is $8: 9$. If there are 187 students in the $5^{\text {th }}$ grade, how many boys are there?
A. 85
B. 88
C. 95
D. 99


2018 MATH Invitational Round 3 Number 6
The ratio of boys to girls in the 5th grade is 8:9. If there are 187 students in the $5^{\text {th }}$ grade, how many boys are there?

B. 88<br>Boys $=8 x$<br>Girls 9x<br>$8 \mathrm{x}+9 \mathrm{x}=187$<br>$17 x=187$<br>$(17 \mathrm{x}) / 17=187 / 17$<br>$\mathrm{x}=11$<br>$8 x=88$ boys

 original price of the computer before the sale and without tax?
A. $\$ 1119.67$
B. $\$ 1181.47$
C. $\$ 1200.00$
D. $\$ 1300.00$

2018 MATH Invitational Round 3 Number 7


Let $x=$ regular price of the computer
With a $45 \%$ discount, Jorge paid $55 \%$ of the price.
D. $\$ 1300.00$

Then $8 \%$ sales tax was added.
$0.55 x=$ sale price
$0.08(0.55 x)=$ sales tax
$0.55 x+0.08(0.55 x)=772.20$
$0.55 x+0.044 x=772.20$
$0.594 x \quad=772.20$
$(0.594 x) / 0.594=772.20 / 0.594$

$$
x=1300
$$

2018 MATH Invitational Round 3 Number 8
Tony has 6 more dimes than quarters. He also has 4 fewer nickels than quarters. If the value of his coins is $\$ 3.20$, how many nickels does he have?

> A. 6
> B. 5
> C. 4
> D. 3


2018 MATH Invitational Round 3 Number 8
Tony has 6 more dimes than quarters. He also has 4 fewer nickels than quarters. If the value of his coins is $\$ 3.20$, how many nickels does he have?

|  | Nickels | Value | Quarters | Value | Dimes | Value | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Q. 3 | Q-4 | 5 | Q | 25 | $6+Q$ | 10 | 320 |

## End

Round
Three


## Solve $x+-17=8$

> A. 25
> B. 9
> C. -8
> D. No solution

2018 MATH Invitational Round 4 Number 1

## Solve $x+-17=8$

$$
\begin{aligned}
& \text { A. } 25 \\
& \begin{aligned}
x+-17 & =8 \\
--17 & =-17 \\
x & =8+17 \\
x & =25
\end{aligned}
\end{aligned}
$$

During the season, Snoopy hit 13 fewer home runs than twice the number hit by Linus. If Linus hit 21 home runs, how many home runs did Snoopy hit?

A. 29
B. 43
C. 32
D. 35

2018 MATH Invitational Round 4 Number 2

# During the season, Snoopy hit 13 fewer home runs than twice the number hit by Linus. If Linus hit 21 home runs, how many home runs did Snoopy hit? 


A. 29

Linus hit 21 homeruns.
Snoopy hit 13 less than twice that number.
Snoopy hit 2(21)-13 = 29 homeruns

Round the sum of 2345.62 and 7893.2 to the nearest ten.
A. 10,240
B. 10,230
C. $10,238.82$
D. 10,000

2018 MATH Invitational Round 4 Number 3

## Round the sum of 2345.62 and 7893.2 to the nearest ten.

## A. 10,240

Complete sum is $10,238.82$.
The 3 is in the ten's place.
The digit after the 3 is 8 , which tells us to round the 3 up.

$$
\text { Solve } 6 \cup+5-2-7=
$$

A. No solution possible.
B. $=2 / 5$
C. $=4$
D. $=2 / 3$


2018 MATH Invitational Round 4 Number 4

$$
\begin{gathered}
\text { Solve } 6 \cup+5-2-7= \\
\text { D. } \varphi=2 / 3
\end{gathered}
$$

$$
\begin{aligned}
6 x+5-2 x-7 & =x \\
6 x-2 x+5-7 & =x \\
4 x-2 & =x \\
4 x-x-2 & =x-x \\
3 x-2 & =0 \\
3 x-2+2 & =0+2 \\
3 x & =2 \\
3 x / 3 & =2 / 3 \\
x & =2 / 3
\end{aligned}
$$





く) (2)

2018 MATH Invitational Round 4 Number 560 seconds
Car Company A charges $\$ 39.95$ per day for its rental cars, with an additional charge of 12C per mile. Company B charges $\$ 79.95$ per day, with no mileage fee. How many miles of daily driving would make Company B the better deal?
A. Less than 333
B. Exactly 333 1/3
C. Over 333 1/3
D. Over 334


2018 MATH Invitational Round 4 Number 5
Car Company A charges $\$ 39.95$ per day for its rental cars, with an additional charge of 12© per mile. Company B charges $\$ 79.95$ per day, with no mileage fee. How many miles of daily driving would make Company B the better deal?

## C. Over 333 1/3

Let $\mathrm{m}=$ number of miles to be driven.


Company A cost more than Company B cost
$39.95+0.12 m>79.95$
-39.95 -39.95
$0.12 m>40$
m > 40/0.12
$m>333.3333$

Tom bought a $1 / 2$ case of soft drinks and gave $1 / 6$ of what he had to Bill. Sue bought a $1 / 3$ case of soft drinks and gave $1 / 4$ of what she had to Amy. Who had the most soft drinks, Bill or Amy?
A. Neither, they both had the same amount B. Bill had the most
C. Amy had the most
D. Can't tell, not enough information

2018 MATH Invitational Round 4 Number 6

> Tom bought a $1 / 2$ case of soft drinks and gave $1 / 6$ of what he had to Bill. Sue bought a $1 / 3$ case of soft drinks and gave $1 / 4$ of what she had to Amy. Who had the most soft drinks, Bill or Amy?

## A. Neither, they both had the same amount

Tom bought 1/2 case.
He gave Bill 1/6(1/2) = 1/12 of a case.
Sue bought $1 / 3$ of a case.
She gave Amy 1/4(1/3) = 1/12 of a case.
So without knowing how many is in a case, both Bill and Amy have $1 / 12$ of a case.


An appliance store had a sale on refrigerators and washing machines. Refrigerators were on sale for $\$ 800$ each and washing machines sold for $\$ 300$ each. If the amount of money collected was $\$ 45,900$, which of these could have been the number of refrigerators sold?
A. 51
B. 50
C. 49
D. Not enough information


2018 MATH Invitational Round 4 Number 7
An appliance store had a sale on refrigerators and washing machines. Refrigerators were on sale for $\$ 800$ each and washing machines sold for $\$ 300$ each. If the amount of money collected was $\$ 45,900$, which of these could have been the number of refrigerators sold?

## A. 51

$$
\begin{aligned}
& 45,900-800(51)=5100 \\
& 45,900-800(50)=5900 \\
& 45,900-800(49)=6700 \\
& 45,900-800(47)=8300
\end{aligned}
$$

Only 5100 is divisible by 300 .


A group of friends want to go to the state fair. If they collect $\$ 5$ from everyone, they will need $\$ 5$ more to pay entrance and parking. If they collect $\$ 7$ each, there will be $\$ 3$ more than they need. How many friends were there and what is the cost for all to attend?
A. 2 friends, $\$ 20$
B. 3 friends, $\$ 21$
C. 4 friends, $\$ 25$
D. 5 friends, $\$ 20$


2018 MATH Invitational Round 4 Number 8
A group of friends want to go to the state fair. If they collect $\$ 5$ from everyone, they will need $\$ 5$ more to pay entrance and parking. If they collect $\$ 7$ each, there will be $\$ 3$ more than they need. How many friends were there and what is the cost for all to attend?


Let $x=$ number of friends going

$$
\begin{aligned}
& 5 x+5=7 x-3 \\
&-5 x \quad-5 x \\
& 5=2 x-3 \\
&+3=\quad+3 \\
& \hline 8=2 x
\end{aligned}
$$

$x=4$ friends

$$
4(\$ 5)+\$ 5=\$ 25
$$

## End

Round Four
 only 18 minutes. How many hours did Tom work that day?
A. 0.2
B. 0.3
C. 0.4
D. 0.5


2018 MATH Invitational Alternate Round Number 1
Tom went into work. Shortly after he got there, he got sick and had to go home. He worked only 18 minutes. How many hours did Tom work that day?

## B. 0.3

Know 1 hour = 60 minutes 18/60 $=0.3$ hour


Taylor is taking a test with 138 questions. How many questions must she answer correctly if she wants a grade of at least $82 \%$ ? Scores will be rounded to the nearest whole percent.
A. 112
B. 113
C. 114
D. 115


2018 MATH Invitational Alternate Round Number 2

## Taylor is taking a test with 138 questions. How many questions must she answer correctly if she wants a grade of at least $82 \%$ ? Scores will be rounded to the nearest whole percent.

## B. 113

$0.82(138)=113.16$
This score will be rounded down to 113.
 following statement? If Allen feeds his cat the same amount of food (c) twice a day, how much food will he feed the cat in a week?

## A. $2 \mathrm{c}+7$

B. $(2 \times c) \times 7$
C. $(2 \times 7) \times 2$
D. $(2+c) \times 7$


2018 MATH Invitational Alternate Round Number 3
Which algebraic expression represents the following statement?
If Allen feeds his cat the same amount of food (c) twice a day, how much food will he feed the cat in a week?

## B. $(2 \times c) \times 7$

Two times c is amount fed per day. There are seven days per week.
Another way to write this might be
 (2c)7 or 2(7c) or simplified as 14c

Bob is selling candles at a one-day craft fair. He determined his profit equation is
$1.75 n-162.75=$ profit, where $n=$ the number of candles sold. How many candles must Bob sell to break even at the craft fair?
A. 87
B. 90
C. 93
D. 95

2018 MATH Invitational Alternate Round Number 4

## Bob is selling candles at a one-day craft fair. He determined his profit equation is $1.75 n-162.75=$ profit, where $n=$ the number of candles sold. How many candles must Bob sell to break even at the craft fair?

At the break even point, profit is zero.
$1.75 n-162.75=0$
$1.75 n-162.75+162.75=0+162.75$
$1.75 n=162.75$
C. 93
$(1.75 n) / 1.75=162.75 / 1.75$
$\mathrm{n}=93$


Or each answer could be checked and study the results.
$1.75(87)-162.75=-10.5$ loss of $\$ 10.50$
$1.75(90)-162.75=-5.25$ loss of $\$ 5.25$
$1.75(93)-162.75=0 \quad$ Bob broke even
$1.75(95)-162.75=3.5 \quad$ profit of $\$ 3.50$

## What is the square root of <br> $(2 \times 3 \times 4 \times 6 \times 25)$ ?

> A. 3600
> B. 360
> C. 60
> D. 36

2018 MATH Invitational Alternate Round Number 5

# What is the square root of <br> $(2 \times 3 \times 4 \times 6 \times 25)$ ? 

## C. 60

$(2 \times 3 \times 4 \times 6 \times 25)$
$(2 \times 3 \times 6) \times 4 \times 25$
$6^{2} \times 2^{2} \times 5^{2}$
So the square root is
$6 \times 2 \times 5$ or 60

How many distinct positive factors does 2018 have?
A. 2
B. 3
C. 4
D. 8


2018 MATH Invitational Alternate Round Number 6

## How many distinct positive factors does 2018 have?

C. 4

2018 has four factors:
1, 2, 1009, and 2018.
1009 is a prime number.
To check, divide 1009 by all primes from 2 to 31.

Farmer Brown is increasing the length and the width of his rectangular-shaped garden by 3 yards each way. If the current size is 10 feet by 15 feet, give the new perimeter in feet.
A. 62
B. 86
C. 234
D. 458


2018 MATH Invitational Alternate Round Number 7

## Farmer Brown is increasing the length and the width of his rectangular-shaped garden by 3 yards each way. If the current size is 10 feet by 15 feet, give the new perimeter in feet.

B. 86

3 yards $=9$ feet
New length is thus $15+9=24$ feet
New width is $10+9=19$ feet


New perimeter is $24+19+24+19=86$ feet

Axel is going downstairs when his cell phone rings. He turns and climbs up 3 steps to his room. The phone stopped ringing, so he turns around and climbs down 5 steps to the bottom step (not the landing). His cell phone rings again, so he climbs up six steps to his room. How many steps are in the staircase?

A. 3
B. 4
C. 5
D. 7

2018 MATH Invitational Alternate Round Number 8
Axel is going downstairs when his cell phone rings. He turns and climbs up 3 steps toward his room. The phone stopped ringing, so he turns around and goes down 5 steps to the bottom step (not the landing). His cell phone rings again, so he climbs up six steps to his room. How many steps are in the staircase?

## D. 7

When he goes back up the last time, he goes up 6 steps, from the bottom step. So there are a total of 7 steps.

## End

Round Alternate

## Coaches, if this is the end of the contest, please be sure to collect team

 calculators from the competition table.