PURDUE
U N I V E R S I T Y

Indiana Academic
M.A.T.H. Bowl
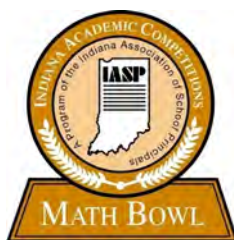
Invitational 2021

Begin
Practice
Round

20 + 20 = ?

A. 20

B. 22

C. 0

D. 40

2021 M.A.T.H. Invitational Practice Round

$$20 + 20 = ?$$

D. 40

End
Practice
Round

Begin Round One

Find the value of $3 \times (9 + 2)$

A. 29
B. 33
C. 34
D. 68

2021 M.A.T.H. Invitational Round 1 Number 1

Find the value of 3 x (9 + 2)

B. 33

3 x (9 + 2)
3 x 11
33

2021 M.A.T.H. Invitational Round 1 Number 2   30 seconds

Cooper runs a lap in 90 seconds. If he ran 4 laps, how many minutes will it take him?

A. 2 minutes
B. 3 minutes
C. 4 minutes
D. 6 minutes

2021 M.A.T.H. Invitational Round 1 Number 2

Cooper runs a lap in 90 seconds. If he ran 4 laps, how many minutes will it take him?

D. 6 minutes

90(4) = 360 seconds
360/60 = 6 minutes

2021 M.A.T.H. Invitational Round 1 Number 3   30 seconds

There are 12 rectangles of chocolate on a Hershey's Bar. If each person eats 5 rectangles, how many people can be served from 8 Hershey's bars?

A. 7.5 people
B. 3 people
C. 19 people
D. 8 people

2021 M.A.T.H. Invitational Round 1 Number 3

There are 12 rectangles of chocolate on a Hershey's Bar. If each person eats 5 rectangles, how many people can be served from 8 Hershey's bars?

C. 19 people

8(12) = 96 rectangles in 8 Hershey bars
96 / 5 = 19 remainder 1

30 seconds

A flea that is 1/8 of an inch tall can jump 9 1/8 inches high. If a person who is six feet tall had the ability to jump like a flea, how high could they jump?

A. 438 feet
B. 180 yards
C. 460 feet
D. 488 feet

2021 M.A.T.H. Invitational Round 1 Number 4

A flea that is 1/8 of an inch tall can jump 9 1/8 inches high. If a person who is six feet tall had the ability to jump like a flea, how high could they jump?

A. 438 feet

The flea jumps 73 times its height because there are 73 eighths in 9 1/8 inches.
73 times 6 feet is 438 feet. This reasoning is easier than doing proportions with mixed numbers.

2021 M.A.T.H. Invitational Round 1 Number 5

45 seconds

The ratio of dogs to cats in the pet parade is 5:3. How many dogs are there if there are 32 pets in the pet parade?

A. 20 dogs
B. 12 dogs
C. 22 dogs
D. 11 dogs

2021 M.A.T.H. Invitational Round 1 Number 5

The ratio of dogs to cats in the pet parade is 5:3. How many dogs are there if there are 32 pets in the pet parade?

A. 20 dogs

dogs	5	10	15	20
cats	3	6	9	12
total	8	16	24	32

Since there are more dogs than cats, we really only need to check the answers 20 and 22 as answers.
20/12 simplifies to 5/3.
22/10 simplifies to 11/5 which is not 5/3

We could also write a proportion using x for the number of dogs and 32-x as the number of cats.

2021 M.A.T.H. Invitational Round 1 Number 6

45 seconds

In a group of 50 students, 10 students passed both the math and science exams. 28 students passed the science exam only. How many students passed the math exam only?

A. 12 students
B. 22 students
C. 32 students
D. 17 students

2021 M.A.T.H. Invitational Round 1 Number 6

In a group of 50 students, 10 students passed the both math and science exams. 28 students passed the science exam only. How many students passed the math exam only?

A. 12 students

28 passed only science
10 passed science and math
These 2 groups have no overlap so a total of 38 passed science.
That leaves 50-38 or 12 students to pass math only.

60 seconds

A jar contains $10.75 in dimes and quarters. If the number of dimes is four more than twice the number of quarters, determine the number of quarters.

A. 23 quarters
B. 24 quarters
C. 25 quarters
D. 26 quarters

2021 M.A.T.H. Invitational Round 1 Number 7

A jar contains $10.75 in dimes and quarters. If the number of dimes is four more than twice the number of quarters, determine the number of quarters.

A. 23 quarters

Let x = number of quarters
4 + 2x = number of dimes

$$25x + 10(4 + 2x) = 1075$$
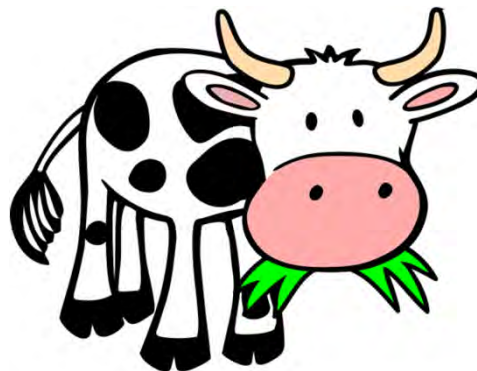$$25x + 40 + 20x = 1075$$
$$45x + 40 = 1035$$
$$45x = 1035$$
$$x = 23$$

Farmer Brown has chickens and cows on his farm. There are 30 total animals. There are 74 legs in all. How many cows does he have?

A. 4 cows
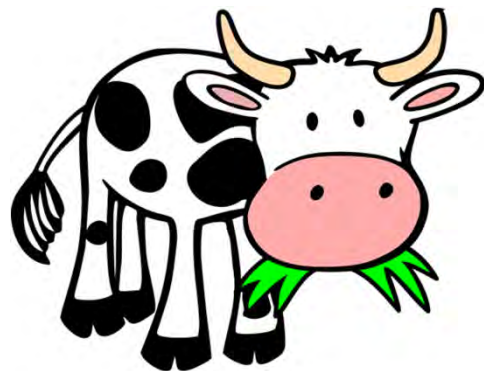B. 5 cows
C. 6 cows
D. 7 cows

2021 M.A.T.H. Invitational Round 1 Number 8

Farmer Brown has chickens and cows on his farm. There are 30 total animals. There are 74 legs in all. How many cows does he have?

Let x = number of cows
Let 30 − x = number of chickens
Cows have 4 legs, chickens have 2 legs each

D. 7 cows

$4x + 2(30 − x) = 74$
$4x + 60 − 2x = 74$
$2x + 60 = 74$
$2x = 14$
$x = 7$

End
Round
One

Begin Round Two

2021 M.A.T.H. Invitational Round 2 Number 1   30 seconds

Find the sum of five and 6.2 and ½.

A. 6.7
B. 11.2
C. 11.7
D. 11 3/12

2021 M.A.T.H. Invitational Round 2 Number 1

Find the sum of five and 6.2 and ½.

C. 11.7

5
6.2
+ 0.5
11.7

45 seconds

Trista reads 16 books every month. If this continues, how many books will she read in 3 years?

A. 480
B. 36
C. 576
D. 48

2021 M.A.T.H. Invitational Round 2 Number 2

Trista reads 16 books every month. If this continues, how many books will she read in 3 years?

C. 576

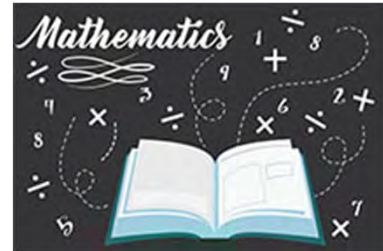12 months per year times 16 books per month times 3 years = 576

Simplify $4x + 6x - 2x + 21x$.

A. $31x$
B. $29x$
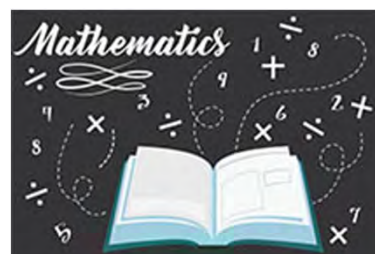C. $x = 9$
D. Answer is not given because there is no equals sign.

2021 M.A.T.H. Invitational Round 2 Number 3

Simplify 4x + 6x – 2x + 21x.

B. 29x

We add the coefficients left to right.
(4 + 6 – 2 + 21)x
(10 – 2 + 21)x
(8 + 21) x
29x

2021 M.A.T.H. Invitational Round 2 Number 4   45 seconds

Ellie earns $50 for each lawn that she mows. For each lawn, she spends $10 and saves the rest. How much will she have saved after mowing 5 yards?

A. $20
B. $200
C. $30
D. $400

2021 M.A.T.H. Invitational Round 2 Number 4

Ellie earns $50 for each lawn that she mows. For each lawn, she spends $10 and saves the rest. How much will she have saved after mowing 5 yards?

B. $200

$50 - $10 = $40 saved from each lawn
$40 x 5 = $200 total savings

2021 M.A.T.H. Invitational Round 2 Number 5   45 seconds

When five squares of equal size are placed next to each other in a row, the perimeter of the rectangle is 84 inches. What is the measurement of one side of one of the squares?

A. 8 inches
B. 7 inches
C. 6 inches
D. 6.5 inches

2021 M.A.T.H. Invitational Round 2 Number 5

When five squares of equal size are placed next to each other in a row, the perimeter of the rectangle is 84 inches. What is the measurement of one side of one of the squares?

B. 7 inches

P = 2L + 2W
Let x = length of side of square
P = 2(5x) + 2x
P = 12x
84 = 12x
 x = 7 inches

Note the picture shows us the 12 side lengths.

2021 M.A.T.H. Invitational Round 2 Number 6   60 seconds

Ten apples plus twenty oranges cost $12.70. Ten oranges plus twenty apples cost $13.70. What is the cost of 30 apples and 30 oranges?

A. $26.40
B. $25.00
C. $1.00
D. $0.49

2021 M.A.T.H. Invitational Round 2 Number 6

Ten apples plus twenty oranges cost $12.70. Ten oranges plus twenty apples cost $13.70. What is the cost of 30 apples and 30 oranges?

A. $26.40

Let x = cost of one apple
Let y = cost of one orange
10x + 20y = 12.70
20x + 10y = 13.70

Adding these equations gives us the requested result.
30x + 30y = $26.40

2021 M.A.T.H. Invitational Round 2 Number 7   45 seconds

At Cooper's Doggie Day Care, the small dogs weigh an average of 25 pounds. The large dogs weigh an average of 75 pounds. There are 4 small dogs and 3 large dogs. What is the average weight of all of the dogs?

A. 45 pounds
B. 46 pounds
C. 47 pounds
D. 48 pounds

2021 M.A.T.H. Invitational Round 2 Number 7

At Cooper's Doggie Day Care, the small dogs weigh an average of 25 pounds. The large dogs weigh an average of 75 pounds. There are 4 small dogs and 3 large dogs. What is the average weight of all of the dogs?

B. 46 pounds

4(25) + 3(75) = 325 pounds for all 7 dogs.
325 ÷ 7 = 46 pound average

2021 M.A.T.H. Invitational Round 2 Number 8   60 seconds

Jackson is building a rectangular pen for his new dog. He will put fence posts 1 yard apart. How many fence posts will he use to build a rectangular pen that is 15 yards by 6 yards?

A. 14 posts
B. 12 posts
C. 42 posts
D. 40 posts

2021 M.A.T.H. Invitational Round 2 Number 8

Jackson is building a rectangular pen for his new dog. He will put fence posts 1 yard apart. How many fence posts will he use to build a rectangular pen that is 15 yards by 6 yards?

Sketch smaller pen, say 2 by 1, note six posts in the picture is same as perimeter.

A second example gives similar result. We could sketch the full pen to confirm.

C. 42 posts

P = 2L + 2W
P = 2(15) + 2(6)
P = 30 + 12
P = 42

End
Round
Two

Begin Round Three

Which is a list of consecutive even integers?

A. 4, 5, 6, 7, 8
B. 20, 22, 24, 26
C. 40, 20, 10, 5, 1
D. 23, 25, 27, 2

2021 M.A.T.H. Invitational Round 3 Number 1

Which is a list of consecutive even integers?

B. 20, 22, 24, 26

A, C, and D all contain odd numbers.
That leaves only B as correct.

45 seconds

The sign on a 16 inch model race car said that
1.2 inches = 1 foot. How long is the actual race car?

A. 12 feet 6 inches
B. 13 feet 4 inches
C. 16 feet 2 inches
D. 15 feet 8 inches

2021 M.A.T.H. Invitational Round 3 Number 2

The sign on a 16 inch model race car said that
1.2 inches = 1 foot. How long is the actual race car?

B. 13 feet 4 inches

$\frac{1.2}{1} = \frac{16}{x}$

1.2x = 1(16)

1.2x/1.2 = 16/1.2

x = 13.3333 feet
x = 13 feet 4 inches

2021 M.A.T.H. Invitational Round 3 Number 3   45 seconds

Solve 6x – 7 = 23

A. 5
B. 2 2/3
C. 180
D. -5

2021 M.A.T.H. Invitational Round 3 Number 3

Solve 6x – 7 = 23

A. 5

6x – 7 = 23
  +7   +7
6x   = 30

6x/6   = 30/6

  x   = 5

2021 M.A.T.H. Invitational Round 3 Number 4   45 seconds

Teachers at Sharp Elementary are going to be given a 5.1% raise in their salary. If Marcie is currently earning $46,000 in salary, what will her new salary be after she is given her raise?

A. $63,460
B. $48,000
C. $48,500
D. $48,346

2021 M.A.T.H. Invitational Round 3 Number 4

Teachers at Sharp Elementary are going to be given a 5.1% raise in their salary. If Marcie is currently earning $46,000 in salary, what will her new salary be after she is given her raise?

5.1% of $46,000 = 0.051(46,000)
Raise is $2,346.

Adding raise to the current wage gives the new wage.

D. $48,346

Carmen is paid $7 an hour, plus a bonus of $18.50 per day. Last Friday, she earned $64. How many hours did she work on that day?

A. 6 ½
B. 5 ½
C. 6
D. 4 ½

2021 M.A.T.H. Invitational Round 3 Number 5

Carmen is paid $7 an hour, plus a bonus of $18.50 per day. Last Friday, she earned $64. How many hours did she work on that day?

A. 6 ½

Let h = number of hours Carmen worked Friday

7h + 18.50 = 64
7h   = 64 – 18.50
7h   = 45.50
 h   = 45.50 / 7
 h   = 6.5 hours

The sum of the angles in any triangle is 180°. The angles in a given triangle are in a ratio of 2:5:17. What is the measurement of the largest angle?

A. 126.5°
B. 127.5°
C. 128°
D. 130°

Angles of Triangles
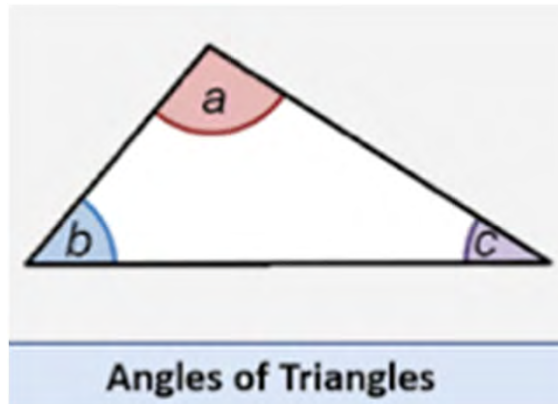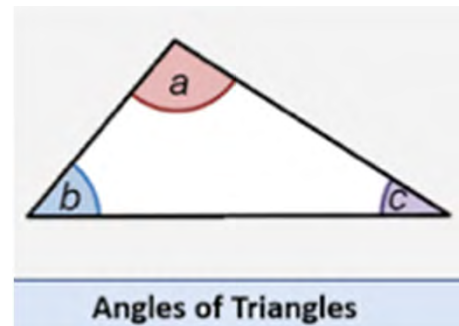
2021 M.A.T.H. Invitational Round 3 Number 6

The sum of the angles in any triangle is 180°. The angles in a given triangle are in a ratio of 2:5:17. What is the measurement of the largest angle?

B. 127.5°

Let x be the common ratio.
2x + 5x + 17x = 180
24x = 180
x = 180/24
x = 7.5
Largest angle is 17x or 17(7.5)

Angles of Triangles

The 4th grade classes completed a math test. The average score of the female students is 84, and the average score of the male students is 86. There are 42 girls, and 50 boys in the 4th grade. What is the average math test score of the entire 4th grade?

A. 81
B. 82
C. 83
D. 85

2021 M.A.T.H. Invitational Round 3 Number 7

The 4th grade classes completed a math test. The average score of the female students is 84, and the average score of the male students is 86. There are 42 girls, and 50 boys in the 4th grade. What is the average math test score of the entire 4th grade?

D. 85   Note that three of the answer choices are less than either average. Only 85 is possible.

84(42) = 3528
86(50) = 4300
3528 + 4300 = 7828
7828 / 92 = 85.08

60 seconds

A snail is climbing up out of a 30 foot well. Every hour he climbs up 3 feet and immediately slides back 2 feet. How long will it take him to get out of the well?

A. 1 day, 6 hours
B. 33 hours
C. 31 hours
D. 28 hours

2021 M.A.T.H. Invitational Round 3 Number 8

A snail is climbing up out of a 30 foot well. Every hour he climbs up 3 feet and immediately slides back 2 feet. How long will it take him to get out of the well?

Simplify the problem. How long to get out of a 3 foot hole? Only one hour as he won't slide back. How long to get out of a 4 foot hole? Two hours; he will climb 3 feet, slide back 2 then climb 3.

D. 28 hours

Each hour, the snail is a foot closer to reaching the top. However, when he reaches the top, he will NOT slide back 2 feet so he should be out of the well in 28 hours, not 30 hours.
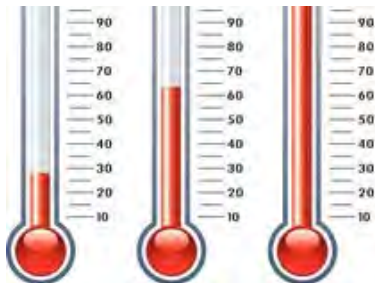
End
Round
Three

Begin Round Four

The mode is a measure of central tendency and occurs in a list more often than the other data items. Find the mode in the following list of temperatures:

22 33 35 46 47 47 47 58 58 87 99
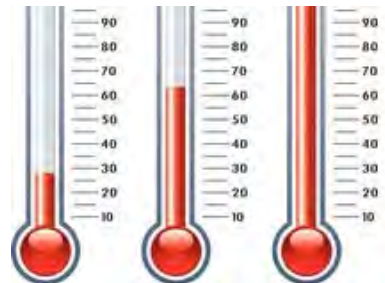
A. 22

B. 47

C. 48

D. 77

2021 M.A.T.H. Invitational Round 4 Number 1

The mode is a measure of central tendency and occurs in a list more often than the other data items. Find the mode in the following list of temperatures:

22 33 35 46 47 47 47 58 58 87 99

B. 47

47 occurs three times and no other data item occurs more often.
47 is the mode.

45 seconds

Find the 28th term in this sequence:

1, 4, 9, 16, 25 …..

A. 140
B. 874
C. 784
D. 840

2021 M.A.T.H. Invitational Round 4 Number 2

Find the 28th term in this sequence:

1, 4, 9, 16, 25 …..

These are the perfect squares.

C. 784

1x1 = 1
2x2 = 4
3x3 = 9
4x4 = 16
5x5 = 25

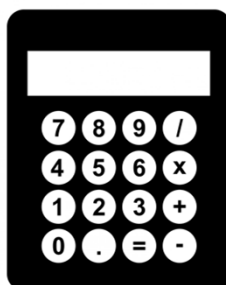So we need 28x28 = 784

2021 M.A.T.H. Invitational Round 4 Number 3   45 seconds

Find the greatest common factor of 45 and 120?

A. 15
B. 30
C. 45
D. 90

2021 M.A.T.H. Invitational Round 4 Number 3

Find the greatest common factor of 45 and 120?

A. 15

45 has factors 1, 3, 5, 9, 15, 45
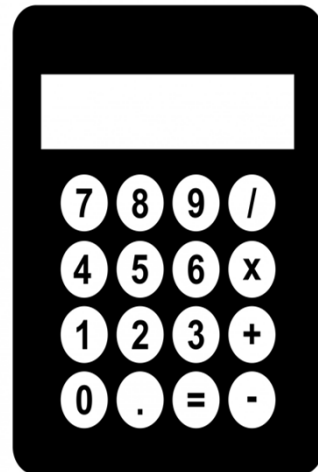120 has factors 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120
GCF is 15

Using prime factorization we have

45 = 3 x **3 x 5**
120 = 2 x 2 x 2 x **3 x 5**
GCF = 3 x 5

2021 M.A.T.H. Invitational Round 4 Number 4   30 seconds

Summer opened a bakery. In her first week, she received orders for 2 cakes. In her second week, she received orders for 6 cakes. In her third week, she received orders for 18 cakes. If the pattern continues, how many cake orders will she have in the fifth week?

A. 18 orders
B. 54 orders
C. 162 orders
D. 200 orders

2021 M.A.T.H. Invitational Round 4 Number 4

Summer opened a bakery. In her first week, she received orders for 2 cakes. In her second week, she received orders for 6 cakes. In her third week, she received orders for 18 cakes. If the pattern continues, how many cake orders will she have in the fifth week?

Week	1	2	3	4	5
# of orders	2	6	18	54	162

C. 162 orders

2021 M.A.T.H. Invitational Round 4 Number 5

60 seconds

Jermaine shared his candy with Jocelyn and Justin. He gave Justin 1/2 of his candy, and he gave Jocelyn 2/3 of what remained. Jermaine had 12 pieces left for himself. How many pieces of candy did he have in the beginning?

A. 76 pieces
B. 84 pieces
C. 96 pieces
D. 72 pieces

2021 M.A.T.H. Invitational Round 4 Number 5

Jermaine shared his candy with Jocelyn and Justin. He gave Justin 1/2 of his candy, and he gave Jocelyn 2/3 of what remained. Jermaine had 12 pieces left for himself. How many pieces of candy did he have in the beginning?

Let x = number of pieces of candy Jermaine has.
$x/2$ = Justin's part of the candy
$2/3(x/2)$ = Jocelyn's part of the candy – simplifies to $x/3$
12 = pieces left after sharing

$x/2 + x/3 + 12 = x$
One way to solve is to multiply by the LCD of 6
$3x + 2x + 72 = 6x$
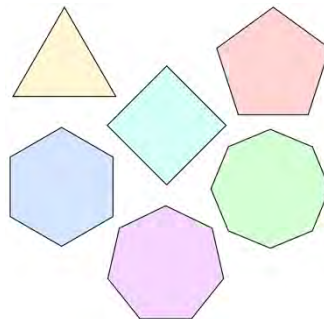
D. 72 pieces $5x + 72 = 6x$
                  $x = 72$

2021 M.A.T.H. Invitational Round 4 Number 6

60 seconds

A triangle has interior angles that add up to 180°. A quadrilateral has interior angles that add up to 360°. A pentagon has interior angles that add up to 540° and a hexagon has interior angles that add up to 720°. What is the total number of degrees of the interior angles in a dodecagon with 12 sides?

A. 2,160°
B. 1,080°
C. 980°
D. 1,800°

2021 M.A.T.H. Invitational Round 4 Number 6

A triangle has interior angles that add up to 180°. A quadrilateral has interior angles that add up to 360°. A pentagon has interior angles that add up to 540° and a hexagon has interior angles that add up to 720°. What is the total number of degrees of the interior angles in a dodecagon with 12 sides?
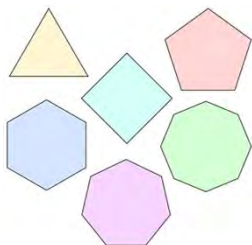
D. 1,800°

Polygon	# of sides	Angle sum
Triangle	3	180
Quadrilateral	4	360
Pentagon	5	540
Hexagon	6	720
Any polygon	n	180(n-2)
Dodecagon	12	180(12-2)

2021 M.A.T.H. Invitational Round 4 Number 7   60 seconds

Oscar can paint a fence in 4 hours. His sister can paint the same fence in 2 hours. If they work together, how long will it take them to paint the fence?

A. 1 hour, 30 minutes
B. 1 hour, 45 minutes
C. 1 hour, 20 minutes
D. 3 hours

2021 M.A.T.H. Invitational Round 4 Number 7

Oscar can paint a fence in 4 hours. His sister can paint the same fence in 2 hours. If they work together, how long will it take them to paint the fence?

C. 1 hour, 20 minutes

Painter	Rate	Time	Work done
Oscar	1/4	t	t/4
sister	1/2	t	t/2
Together			t/4 + t/2 = 1

t/4 + t/2 = 1 together they paint whole fence
If we multiply by 4 the equation becomes
t + 2t = 4
3t = 4
T = 4/3 hours or 1 hour, 20 minutes

2021 M.A.T.H. Invitational Round 4 Number 8   60 seconds

Six consecutive multiples of 5 add up to be 465.
What is the largest number?

A. 85
B. 80
C. 75
D. 90

2021 M.A.T.H. Invitational Round 4 Number 8

Six consecutive multiples of 5 add up to be 465. What is the largest number?

Multiples of 5 differ by 5 such as 5, 10, 15, 20

Let x = largest number
x – 5 = second largest multiple
x – 10 = third largest multiple
x – 15 = third smallest multiple
x – 20 = second smallest multiple

D. 90   x – 25 = smallest multiple

x + (x – 5) + (x –10) + (x – 15) + (x – 20) + (x – 25) = 465
6 x – 75 = 465
6x = 540
x = 90

End
Round
Four