

# Math Field Day 2017

Mad Hatter 6-8

CSU Fresno

[www.fresnostate.edu/csm/math/](http://www.fresnostate.edu/csm/math/)

22 April 2017

# Mad Hatter 6-8

Math Field  
Day 2017

CSU Fresno

Welcome to Fresno State!

The Mad Hatter Marathon is a competition in rapid computation and problem solving. You will find that you do not have time to solve every problem. After a few minutes you may feel “mentally out of breath.” Do not let this discourage you. Your fellow contestants feel the same way. That is why this contest is called *Mad Hatter Marathon!*

# Mad Hatter 6-8

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The Mad Hatter Marathon is divided into two problem solving periods, each lasting 45 minutes. Between the two periods there will be a 15 minute break.

# Part I

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## Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

- **This part of the exam consists of 30 problems.**
- The problems will be shown one at a time.
- You will have one and a half minutes to solve the problem shown.
- After one and a half minutes a new problem will be shown.
- You may move to a new question without solving the old one.

As soon as you have solved the problem mark your answer in the corresponding space on the Scantron form.

# Part I

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

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# Part I

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

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# Part I

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

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Problems  
16-30

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# Part I

Math Field  
Day 2017

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Part I

Part I:  
Problems 1-15

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Problems  
16-30

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# Part I

Math Field  
Day 2017

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

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# Rules and Scoring

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

You may use pencil and scratch paper to do calculations, but **calculators are not allowed**.

Your score is the total number of correct answers, so give the best answer that you can in the time available for each problem. There is no penalty for guessing.

# Reminders

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## Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

- Please turn off any devices that could make noise, such as cell phones, beepers, watches, etc.
- If your pencil breaks or needs sharpening, stay in your seat and raise your hand.
- Keep your eyes on your own paper. Keep your Scantron flat on your desk. Contestants caught cheating will be disqualified.

# Ready... Set... Go!

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Prepare to begin the *Mad Hatter Marathon!*

# Part I - Problem 1

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

A room has six doors. In how many ways is it possible to enter by one door and leave by a different door?

- A 15
- B 11
- C 30
- D 12
- E 36

# Part I - Problem 2

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Part I

Part I:  
Problems 1-15

Problem 1

**Problem 2**

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Moonbase America is 375,000 km away from Fresno State. If Space Ghost flies at his top speed of 100 mph, how many days will it take him get to the moonbase? (There is 1.6 km in every mile).

- A 3750 days
- B 97.656 days
- C 2343.75 days
- D 56.25 days
- E 28.125 days

# Part I - Problem 3

Math Field  
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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

**Problem 3**

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Wario buys a new car that comes with five new tires, one for each wheel and one spare tire in the trunk. Wario is economical and drives using the spare tire as much as any of the other four tires. If Wario drives 2010 miles, what will be the wear in miles on each tire?

- A 2512.5 miles
- B 1608 miles
- C 2010 miles
- D 1780.5 miles
- E 1473 miles

# Part I - Problem 4

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

**Problem 4**

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Finn has an equal number of dimes, nickels, and pennies. Rey has three more dimes than Finn and two more pennies. Rey also has twice as many nickels than Finn. If Rey has nine pennies, then how much money does Finn have?

- A \$1.12
- B \$1.34
- C \$1.42
- D \$1.51
- E \$1.60



# Part I - Problem 5

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

**Problem 5**

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

The average of seven whole numbers is 7. If six of the numbers are 1, then the seventh number is:

A 1

B 7

C 13

D 43

E none of these

# Part I - Problem 6

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

**Problem 6**

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Which of the following ratios is NOT equivalent to the other three?

6 out of 20

12%

0.3

$\frac{3}{10}$

A 6 out of 20

B 12%

C 0.3

D  $\frac{3}{10}$

# Part I - Problem 7

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

**Problem 7**

Problem 8

Problem 9

Problem 10

Problem 11

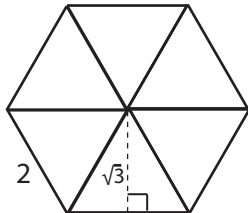
Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30



Pictured is a regular hexagon. What is its area?

- A  $2\sqrt{3}$
- B  $3\sqrt{3}$
- C  $6\sqrt{3}$
- D  $12\sqrt{3}$
- E None of these

# Part I - Problem 8

Math Field  
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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

**Problem 8**

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Sam and Max visited the concessions stand at the Quidditch match. The stand charged \$4.50 for a sandwich and \$1.50 for a lemonade. They bought a total of eight items and spent \$21. How many sandwiches did they buy?

A 1

B 2

C 3

D 4

E 5

# Part I - Problem 9

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

**Problem 9**

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Of the following, which is the first time after 4:30 that the minute and hour hands of a circular alarm clock *no longer* form an acute angle?

**A** 4:36

**C** 4:38

**E** all of the  
choices are  
acute

**B** 4:37

**D** 4:39

# Part I - Problem 10

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

**Problem 10**

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

The Sweet Valley High School cheerleaders are selling popcorn to raise money for their trip to Abu Dhabi. They are able to purchase bags of popcorn in wholesale cases of 24 bags. If Mr. McButterpants places an order for 216 bags of popcorn, how many cases will the cheerleaders need to fill his order?

**A** 9

**B** 8

**C** 7

**D** 6

**E** 4

# Part I - Problem 11

Math Field  
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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

**Problem 11**

Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Which of the following is a factor of  $2^6 \cdot 3^4 \cdot 5^3$ ?

A 14

B 30

C 33

D 128

E 175

# Part I - Problem 12

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

**Problem 12**

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30

Kermit has 18 cookies. Every day he will eat either two cookies or three cookies. At most how many days will the cookies last?

- A 9 days
- B 8 days
- C 7 days
- D 6 days
- E 5 days



# Part I - Problem 13

Math Field  
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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

**Problem 13**

Problem 14

Problem 15

Part I:  
Problems  
16-30

The three angles of a triangle can measure  $20^\circ$ ,  $40^\circ$ , and:

- A  $60^\circ$
- B  $80^\circ$
- C  $90^\circ$
- D  $120^\circ$
- E none of these

# Part I - Problem 14

Math Field  
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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

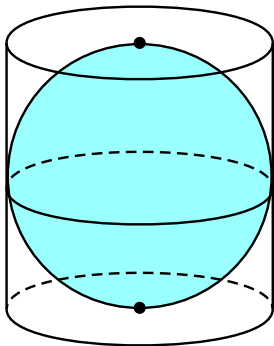
Problem 12

Problem 13

**Problem 14**

Problem 15

Part I:  
Problems  
16-30



The sphere is perfectly enclosed in the cylinder. What percentage of the cylinder's volume is taken up by the sphere?

**A** 50%

**B** 48%

**C** 34%

**D** 22%

**E**  $66.\bar{6}\%$

# Part I - Problem 15

Math Field  
Day 2017

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Part I

Part I:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

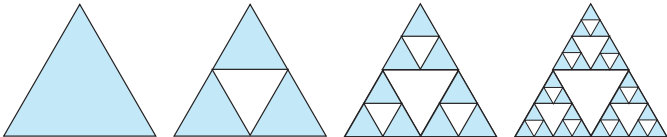
Problem 12

Problem 13

Problem 14

Problem 15

Part I:  
Problems  
16-30



If this pattern continues how many white triangles will there be in the next figure?

- A 33
- B 40
- C 60
- D 81
- E None of the above

# Part I - Problem 16

Math Field  
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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

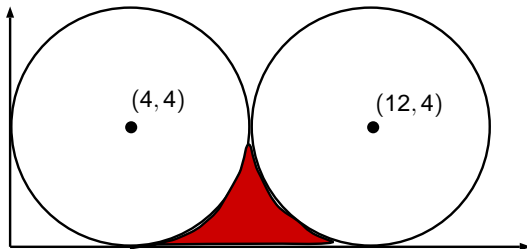
Problem 27

Problem 28

Problem 29

Problem 30

Pictured are two circles with radius four. The centers of the circles are indicated by the points. What is the area of the red shaded region?



A  $64 - 16\pi$

B  $32 - 8\pi$

C  $16 - 2\pi$

D  $64 - 4\pi$

E None of the  
these

# Part I - Problem 17

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

**Problem 17**

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

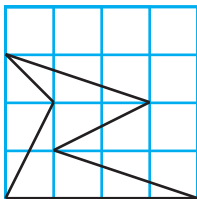
Problem 26

Problem 27

Problem 28

Problem 29

Problem 30



What is the area of the figure pictured? (Assume that each square in the grid is 1 square unit.)

- A 3 square units
- B 4 square units
- C 5 square units
- D 6 square units
- E None of A-D

# Part I - Problem 18

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

**Problem 18**

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The length of the side of a square is what percentage of the perimeter of the square?

- A 4%
- B 25%
- C 40%
- D 50%
- E 67%

# Part I - Problem 19

Math Field  
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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

**Problem 19**

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

Which of the following is between  $\frac{7}{18}$  and  $\frac{1}{2}$ ?

A  $\frac{1}{4}$

C  $\frac{2}{3}$

E  $\frac{7}{13}$

B  $\frac{4}{9}$

D  $\frac{5}{16}$

# Part I - Problem 20

Math Field  
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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

**Problem 20**

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

What is the remainder when  $3^{2017}$  is divided by 5?

**A** 0

**B** 1

**C** 2

**D** 3

**E** 4



# Part I - Problem 21

Math Field  
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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

**Problem 21**

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

If two fair six-sided dice are rolled, what is the probability of getting two numbers that add up to either 7 or 11?

**A**  $\frac{1}{6}$

**C**  $\frac{2}{9}$

**E**  $\frac{1}{8}$

**B**  $\frac{7}{11}$

**D**  $\frac{1}{4}$

# Part I - Problem 22

Math Field  
Day 2017

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

**Problem 22**

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The symbol  $\boxtimes$  represents the numerical operation

$$a \boxtimes b = a^b - b^a$$

What is the value of  $2 \boxtimes 5$

- A 7
- B 36
- C 34
- D 42
- E 24

# Part I - Problem 23

Math Field  
Day 2017

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

**Problem 23**

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

Zelda checked out a 603-page novel from the library for two weeks. In the first 9 days, she read 288 pages. On average, how many pages does she need to read each remaining day in order to finish the book before it is due?

**A** 65

**B** 68

**C** 74

**D** 71

**E** 63

# Part I - Problem 24

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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

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Problem 21

Problem 22

Problem 23

**Problem 24**

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

In a class survey, the Space Cadets were asked for their preferred field trip destination. Their responses are shown in the table:

	Mars	Jupiter	Bakersfield	TOTAL
Boys	7	3	2	12
Girls	5	2	6	13

What percentage of the class prefers to visit Mars on their field trip?

A 50%

C 34%

E  $66.\bar{6}\%$

B 48%

D 22%

# Part I - Problem 25

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

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Problem 22

Problem 23

Problem 24

**Problem 25**

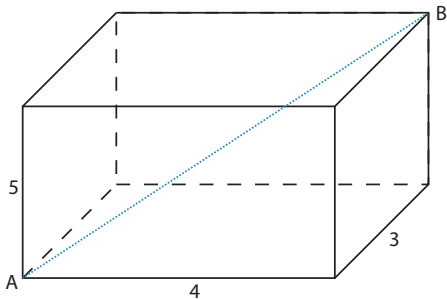
Problem 26

Problem 27

Problem 28

Problem 29

Problem 30



For the rectangular box shown, what is the length of the diagonal AB?

A  $2\sqrt{5}$

B  $3\sqrt{2}$

C  $4\sqrt{5}$

D  $\sqrt{5}$

E  $5\sqrt{2}$

# Part I - Problem 26

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

**Problem 26**

Problem 27

Problem 28

Problem 29

Problem 30

Doogie's Dog Walkers charges an annual membership of \$25 and walking sessions are \$30 each. Muffy's Mutt Minders charges \$65 membership and \$20 per session for dog walking. How many sessions will make the total cost of the two services equal?

A 12

C 6

E None of these

B 8

D 4

# Part I - Problem 27

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

**Problem 27**

Problem 28

Problem 29

Problem 30

Beavis multiplied three different prime numbers together.  
How many different whole numbers are factors of this product?

A 3

C 8

E none of these

B 6

D 9

# Part I - Problem 28

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

**Problem 28**

Problem 29

Problem 30

BB-8 is 0.67 meters tall. R2-D2 is 1.09 meters tall. Han Solo is as tall as BB-8 and R2-D2 put together. How much taller is Han Solo than BB-8?

- A 0.42 meters
- B 0.67 meters
- C 1.09 meters
- D 1.51 meters
- E 1.76 meters



# Part I - Problem 29

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

**Problem 29**

Problem 30

Of the following, which has an odd quotient when divided by 2?

- A** 456,456,456,456,456
- B** 678,678,678,678,678
- C** 432,432,432,432,432
- D** 876,876,876,876,876
- E** 380,380,380,380,380

# Part I - Problem 30

Math Field  
Day 2017

CSU Fresno

Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

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Problem 27

Problem 28

Problem 29

Problem 30

Mayor McCheese has died of a cardiac arrest. Ronald, Grimace, Birdie and the Hamburgler ran to replace him as Prime Minister of McDonaldland. 870 votes were cast and Grimace won. Grimace received 300 more votes than Ronald, 350 more votes than Birdie, and 480 more votes than the Hamburgler. How many votes did Grimace get?

A 500

C 580

E 640

B 540

D 620

# Mad Hatter - 15 minute break

Math Field  
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Part I

Part I:  
Problems 1-15

Part I:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

Whew! You've reached the end of Part I.

- Please make sure your full name and school name are on your Scantron form.
- Pass your Scantrons in.
- You may leave your belongings here during the break.
- Part II will begin promptly in **15 minutes**.

# Mad Hatter - Part II

Math Field  
Day 2017

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## Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

The rules for this part of the competition are the same as the previous part.

- This part of the exam consists of 30 problems.
- The problems will be shown one at a time.
- You will have one and a half minutes to solve the problem shown.
- After one and a half minutes a new problem will be shown.
- You may move to a new question without solving the old one.

As soon as you have solved the problem mark your answer in the corresponding space on the Scantron form.

# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

The rules for this part of the competition are the same as the previous part.

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# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

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# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

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# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

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# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

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# Mad Hatter - Part II

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

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# Ready... Set... Go!

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

Prepare to restart the *Mad Hatter Marathon!*

# Part II - Problem 1

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

A pythagorean triple is a set of three numbers  $x, y, z$  such that  $x^2 + y^2 = z^2$ . Which of the following are pythagorean triples?

I.  $x = 1, y = 2, z = 3$

II.  $x = 2, y = 3, z = 4$

III.  $x = 3, y = 4, z = 5$

- A I only
- B II only
- C III only
- D I, II and III are all pythagorean triples
- E None of them are pythagorean triples

# Part II - Problem 2

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

**Problem 2**

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Yoshi has  $\frac{2}{3}$  of whole  
strawbananboozlewangdangdingle-berry pie to share with  
his friends Mario and Luigi. What fraction of the original pie  
will each of the three kids get?

A  $\frac{2}{9}$

C  $\frac{6}{3}$

E  $\frac{1}{3}$

B  $\frac{2}{5}$

D  $\frac{6}{9}$

# Part II - Problem 3

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

**Problem 3**

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Space Ghost finds a PS-Vita and an iPod at a garage sale. Together they cost \$250. The iPod costs \$20 more than the Vita. How much does the Vita cost?

- A \$70
- B \$85
- C \$100
- D \$105
- E \$115

# Part II - Problem 4

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

**Problem 4**

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Ratchet recently found a basket of kumquats on his doorstep. The problem is that Ratchet HATES kumquats. So he gave  $\frac{3}{7}$  of the kumquats to his friend Clank and half of the remaining kumquats to his neighbor Lara. This left Ratchet with six kumquats. How many kumquats were originally in the basket?

A 14

B 21

C 28

D 35

E 42

# Part II - Problem 5

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

**Problem 5**

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

A total of 84 students compete every year in Fresno State's shin kicking competition. Last year each team had six members. How many more teams can be formed this year by having four member teams instead of six member teams?

A 5

C 7

E none of these

B 6

D 14



# Part II - Problem 6

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

**Problem 6**

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Stimpy's rubber nipple plant in New Jersey manufactures 14,000 nipples per day. The nipples all sell for 6 cents each. What is the 30-day income from Stimpy's plant?

**A** \$25,200

**C** \$16,800

**E** \$44,000

**B** \$65,400

**D** \$33,400

# Part II - Problem 7

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

**Problem 7**

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

$$5 \times 5 \times 5 \times 2 \times 2 \times 2 \times 2 \times 2 = 4 \times X$$

What is  $X$ ?

A 125

C  $125 \times 4$

E none of these

B  $125 \times 2$

D  $125 \times 8$

# Part II - Problem 8

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

**Problem 8**

Problem 9

Problem 10

Problem 11

Problem 12

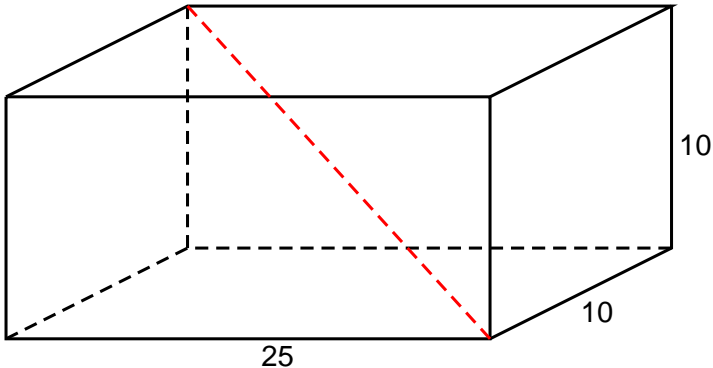
Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End



Shown is a rectangular prism with the dimensions indicated. What is the length of the red diagonal?

A  $\sqrt{825}$

B  $\sqrt{325}$

C  $\sqrt{425}$

D  $\sqrt{1025}$

E None of these

# Part II - Problem 9

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

**Problem 9**

Problem 10

Problem 11

Problem 12

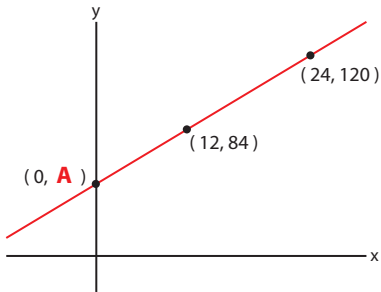
Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End



What is the value of **A** above?

**A** 84

**B** 12

**C** 26

**D** 48

**E** 50

# Part II - Problem 10

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

**Problem 10**

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Billy and the Boingers are coming to the Save-Mart center this year. Tickets cost \$18.75. If Lara and her fifteen friends all go to the concert, which is the best approximation for how much the tickets will cost altogether?

**A** \$240

**B** \$275

**C** \$305

**D** \$345

**E** \$400

# Part II - Problem 11

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

**Problem 11**

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

If you have three flavors of ice cream and two types of cones, how many different single scoop ice cream cones can you make?

A 2

B 3

C 5

D 6

E 7

# Part II - Problem 12

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

**Problem 12**

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

After a long day of petting kittens, Darth Vader goes to bed at 1:00 AM. If he sleeps for 472 minutes then what time will it be when he wakes up?

- A 7:02 AM
- B 8:52 AM
- C 9:02 AM
- D 9:52 AM
- E 10:02 AM

# Part II - Problem 13

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

**Problem 13**

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Shrek multiplied one whole number by 18. He then multiplied a second whole number by 21. Then he added the two products. Of the following, which *could* have been the resulting sum?

A 1996

C 1998

E none of these

B 1997

D 1999



# Part II - Problem 14

Math Field  
Day 2017

CSU Fresno

Part II

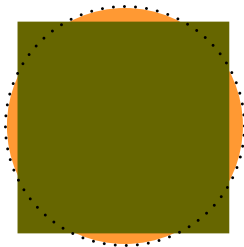
Part II:  
Problems 1-15

- Problem 1
- Problem 2
- Problem 3
- Problem 4
- Problem 5
- Problem 6
- Problem 7
- Problem 8
- Problem 9
- Problem 10
- Problem 11
- Problem 12
- Problem 13
- Problem 14**
- Problem 15

Part II:  
Problems  
16-30

The End

A square hamburger is centered on top of a circular bun. If the burger and bun both have an area of 16 square inches **approximately** how far does each corner of the burger stick out from the bun?



- A** 0.15 in
- B** 0.55 in
- C** 1.25 in
- D** 2.25 in

# Part II - Problem 15

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Problem 1

Problem 2

Problem 3

Problem 4

Problem 5

Problem 6

Problem 7

Problem 8

Problem 9

Problem 10

Problem 11

Problem 12

Problem 13

Problem 14

Problem 15

Part II:  
Problems  
16-30

The End

Two 600 ml pitchers contain orange juice. One pitcher is  $\frac{1}{3}$  full and the other is  $\frac{2}{5}$  full. Water is added to fill each pitcher completely, then both pitchers are poured into one large container. What fraction of the mixture in the large container is orange juice?

A  $\frac{9}{25}$

B  $\frac{11}{30}$

C  $\frac{23}{60}$

D  $\frac{13}{40}$

E  $\frac{17}{35}$

# Part II - Problem 16

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Arrange the following numbers from least to greatest:

$$\frac{8}{12} \quad 0.36 \quad -0.6, -\frac{1}{4}$$

**A**  $-0.6, -\frac{1}{4}, 0.36, \frac{8}{12}$

**B**  $-\frac{1}{4}, -0.6, \frac{8}{12}, 0.36$

**C**  $-\frac{1}{4}, -0.6, 0.36, \frac{8}{12}$

**D**  $0.36, \frac{8}{12}, -0.6, -\frac{1}{4}$

# Part II - Problem 17

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

**Problem 17**

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

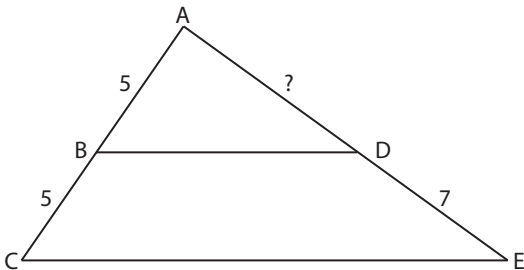
Problem 27

Problem 28

Problem 29

Problem 30

The End



Side  $BD$  is parallel to side  $CE$ . What is the length of side  $AD$ ?

**A** 7

**B** 3.5

**C** 3

**D** 8

**E** 7.5

# Part II - Problem 18

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

**Problem 18**

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

What is the sum of the number of days in the following months:

January, March, April  
May, June, July  
August, September, October  
November and December

**A** 334

**C** 336

**E** 338

**B** 335

**D** 337

# Part II - Problem 19

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

**Problem 19**

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Start with a positive number then square your number. Now add 1 to the result and take the square root of the sum. Finally, subtract 1 from what you have. Your final result will be:

- A** always equal to the starting number
- B** always smaller than the starting number
- C** always larger than the starting number
- D** sometimes larger, sometimes smaller, but never equal to the starting number
- E** sometimes larger, sometimes smaller, and sometimes equal to the starting number

# Part II - Problem 20

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

**Problem 20**

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Which of the following numbers has the *most* divisors?

- A 16
- B 34
- C 85
- D 101
- E 121

# Part II - Problem 21

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

**Problem 21**

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

The number 12 has six positive integer factors

1, 2, 3, 4, 6, and 12.

What is the largest two-digit integer that has exactly four positive integer factors?

A 89

B 99

C 87

D 95

E 91



# Part II - Problem 22

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

**Problem 22**

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Ms. Ivy spends her free time gardening. This week she spent \$4.90 for seed, \$8.95 for fertilizer, and bought eight bags of compost for \$4.99 each. What is the total amount that she spent this week?

**A** \$18.84

**C** \$37.23

**E** \$53.77

**B** \$28.84

**D** \$43.63

# Part II - Problem 23

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

**Problem 23**

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Sue is twice as old as her sister Kate. If Kate was seven a year ago, how old will Sue be three years from now?

- A 11
- B 17
- C 12
- D 15
- E 19

# Part II - Problem 24

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

**Problem 24**

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

The country of Vegeteria has four armed services

Army

Navy

Air Force

The Royal Mounted Penguin Brigade

Of the 4,300 Vegetarians who enlisted in the armed forces this year, 17% enlisted in the Army. How many people enlisted in the other three branches?

**A** 731

**C** 2693

**E** 3978

**B** 1299

**D** 3569

# Part II - Problem 25

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

**Problem 25**

Problem 26

Problem 27

Problem 28

Problem 29

Problem 30

The End

Mario's pizzas cost \$18 and have twelve slices each.

Thor wants 6 slices of pizza, the Wonder Twins want 1 slice each, Spider-Man wants 1 slice, and the Hulk wants 2 pizzas. Lastly, Iron Man and Captain America want 1 pizza to share.

How much will it cost to feed everyone?

**A** \$36

**C** \$72

**E** \$108

**B** \$54

**D** \$90

# Part II - Problem 26

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

**Problem 26**

Problem 27

Problem 28

Problem 29

Problem 30

The End

What is the decimal representation of  $\frac{3}{11}$ ?

- A  $0.33\overline{3}$
- B  $0.330\overline{330}$
- C  $0.27\overline{27}$
- D  $0.113\overline{113}$
- E  $0.31\overline{1311}$

# Part II - Problem 27

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

**Problem 27**

Problem 28

Problem 29

Problem 30

The End

Which of the answer choices is equal to the following:

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

A  $\frac{57}{16}$

C  $\frac{67}{20}$

E  $\frac{77}{36}$

B  $\frac{89}{36}$

D  $\frac{31}{18}$

# Part II - Problem 28

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

**Problem 28**

Problem 29

Problem 30

The End

If Matthew gave R.J. \$5 then Matthew would still have \$8 more than R.J. If R.J. started with \$10 then how much money did Matthew start with?

- A \$5
- B \$13
- C \$15
- D \$23
- E \$28

# Part II - Problem 29

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

**Problem 29**

Problem 30

The End

There are 15 girls and 11 boys in a math class. If a student is selected at random to answer a question, what is the probability that a boy will be selected?

A  $\frac{4}{26}$

B  $\frac{11}{26}$

C  $\frac{11}{15}$

D  $\frac{15}{11}$

E Not enough information to answer



# Part II - Problem 30

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

Problem 16

Problem 17

Problem 18

Problem 19

Problem 20

Problem 21

Problem 22

Problem 23

Problem 24

Problem 25

Problem 26

Problem 27

Problem 28

Problem 29

**Problem 30**

The End

Ten pennies are lined up in a row. First replace every other coin with a nickel. Then replace every third coin with a dime. What is the final value of all the coins?

- A 51 cents
- B 53 cents
- C 57 cents
- D 61 cents
- E 63 cents

# Mad Hatter - Done!

Math Field  
Day 2017

CSU Fresno

Part II

Part II:  
Problems 1-15

Part II:  
Problems  
16-30

The End

## You made it!

- Please make sure your full name and school name are on your Scantron form.
- Pass your Scantron in.
- Please take your belongings with you.
- There will be games and other fun activities in Science II, Room 109, from 1:00-2:30.
- The awards ceremony will begin at **2:45pm**. If there are any ties, you have to be present to win the tiebreaker. See you there!

## Part I

1	c	6	b	11	b	16	b	21	c	26	d
2	b	7	c	12	a	17	e	22	a	27	c
3	b	8	c	13	d	18	b	23	e	28	c
4	a	9	d	14	e	19	b	24	b	29	b
5	d	10	a	15	b	20	d	25	e	30	a

## Part II

1	c	6	a	11	d	16	a	21	d	26	c
2	a	7	d	12	b	17	a	22	e	27	d
3	e	8	a	13	c	18	d	23	e	28	e
4	b	9	d	14	b	19	b	24	d	29	b
5	c	10	c	15	b	20	a	25	c	30	b