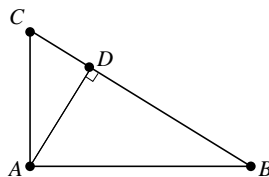


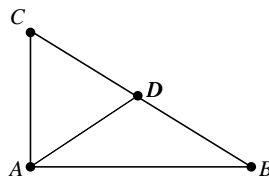
UGA MATHEMATICS TOURNAMENT
 FEBRUARY 2, 2002
 CIPHERING ANSWERS

- 1.1 Given right $\triangle ABC$ with $AB = 4$ and $AC = 3$. Suppose D lies on \overline{BC} and \overline{AD} is perpendicular to \overline{BC} . What is AD ?

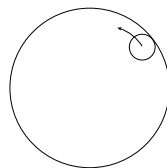


- 1.2 Express $\frac{\log_3 8}{\log_9 2}$ with as few “logs” as possible.
- 1.3 Two runners run around a racetrack, each at a constant speed. When they run in the same direction, they meet each other every 15 minutes. When they run in opposite directions, they meet each other every 5 minutes. What is the ratio of the speed of the faster runner to that of the slower runner?
- 1.4 How many distinct six-letter strings can be formed from three U 's, two G 's, and one A ?
- 2.1 If the polynomial $p(x) = x^9 + x^6 + x^4 - x + c$ is divisible by $x + 1$, then what is c ?

- 2.2 Given right $\triangle ABC$ with $AB = 4$ and $AC = 3$. Suppose D is the midpoint of \overline{BC} . What is AD ?



- 2.3 A circle of radius 1 inch rolls *inside* a circle of radius 8 inches. How many full revolutions does it make before returning to its original position?



- 2.4 Fill in the missing digits so that the six-digit number N will be divisible by 99:

$$N = 2_25_7$$

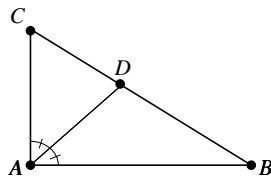
3.1 Express in terms of a single square root:

$$\sqrt{27} + \sqrt{75} - \sqrt{147}.$$

3.2 What is the angle formed by the hands of a clock at 2:20?

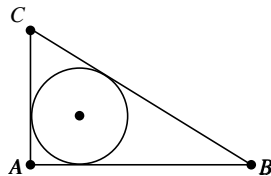
3.3 A drawer contains 6 blue socks and 4 white socks. Two socks are selected randomly (without replacement). What is the probability that the socks are the same color?

3.4 Given right $\triangle ABC$ with $AB = 4$ and $AC = 3$. Suppose D lies on \overline{BC} and \overline{AD} bisects $\angle A$. What is BD ?



4.1 A car was driven 280 miles at constant speed. If it had gone 5 mph faster, the trip would have taken one hour less time. What was the speed of the car (in mph)?

4.2 Given right $\triangle ABC$ with $AB = 4$ and $AC = 3$. What is the radius of the circle inscribed in $\triangle ABC$?



4.3 What is $(i + 1)^8 + (i - 1)^8$?

4.4 An unbiased coin is tossed 8 times. What is the probability that it comes up heads an odd number of times?

ANSWERS

1.1 $12/5$

1.2 6

1.3 2

1.4 60

2.1 -2

2.2 $5/2$

2.3 7

2.4 272547

3.1 $\sqrt{3}$

3.2 50° or $5\pi/18$

3.3 $7/15$

3.4 $20/7$

4.1 35

4.2 1

4.3 32

4.4 $1/2$