

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. In regular pentagon  $ABCDE$ , diagonals  $\overline{AC}$  and  $\overline{AD}$  meet diagonal  $\overline{BD}$  at points  $X$  and  $Y$ , respectively. Given that  $AB = 1$ , what is the length of  $\overline{XY}$ ? Express your answer as a common fraction in simplest radical form. [*We found many of the angles in the diagram last week, and these will be helpful for finding isosceles triangles and similar triangles.*]

10. Tosh rolls two standard six-sided dice while Brant rolls one standard six-sided die. What is the probability that the larger of Tosh's rolls is (strictly) greater than Brant's roll? Express your answer as a common fraction.

1.  $1/3$

2.  $3/2$

3.  $9/2$

4.  $2\sqrt{5}$  (*MATHCOUNTS 2016: State Countdown*)

5.  $3\sqrt{2}$

6.  $2$

7.  $1/2$

8.  $81$  (*MATHCOUNTS 2013: National Sprint #14*)

9. In regular pentagon  $ABCDE$ , diagonals  $\overline{AC}$  and  $\overline{AD}$  meet diagonal  $\overline{BD}$  at points  $X$  and  $Y$ , respectively. Given that  $AB = 1$ , what is the length of  $\overline{XY}$ ? Express your answer as a common fraction in simplest radical form.

$$\boxed{\frac{3 - \sqrt{5}}{2}}$$

10. Tosh rolls two standard six-sided dice while Brant rolls one standard six-sided die. What is the probability that the larger of Tosh's rolls is (strictly) greater than Brant's roll? Express your answer as a common fraction.

$$\boxed{125/216}$$