

Student Name: \_\_\_\_\_  
Please write your name on *every* page.

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#### 4 Section D

##### D1

How many prime numbers less than 100 contain a 1?

Answer to D1: \_\_\_\_\_

##### D2

What is the probability that a randomly chosen letter of the alphabet is a vowel? (here Y counts as a vowel).

Answer to D2: \_\_\_\_\_

##### D3

The songs on an album and their lengths are given in the table below. Which song number is closest to the mean length of a song on the album?

Song	Length (mins:secs)
Song 1	11:26
Song 2	9:47
Song 3	5:00
Song 4	9:00
Song 5	7:58
Song 6	9:13
Song 7	10:02

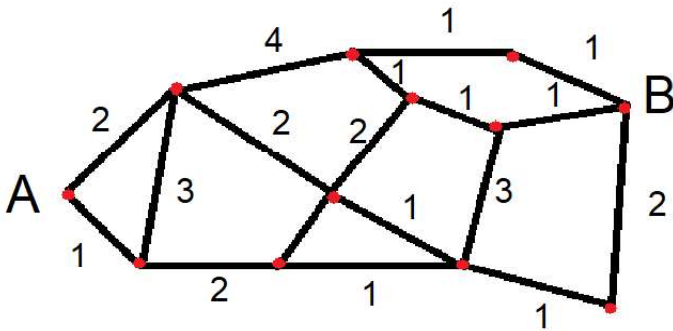
Answer to D3: \_\_\_\_\_

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**D4**

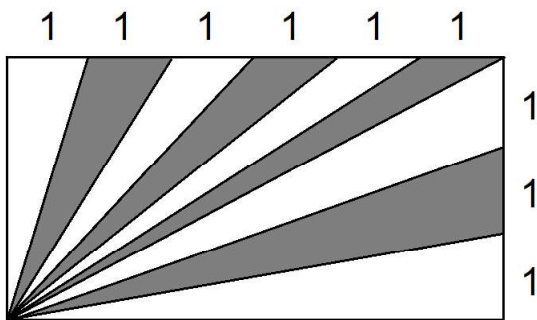
In the diagram below, what is the length of the shortest path between A and B?



Answer to D4: \_\_\_\_\_

**D5**

Find the area of the shaded regions in the diagram below:



Answer to D5: \_\_\_\_\_

**D6**

What is the smallest positive integer whose digits multiply to 36?

Answer to D6: \_\_\_\_\_

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**D7**

Emily and Logan each pick a number at random from the set  $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$  (they may each pick the same number or different numbers). What is the probability that Emily's number is larger than Logan's number?

Answer to D7: \_\_\_\_\_

**D8**

Eugene is a wizard who is in a competition to see who has the strongest spells. Each wizard casts a spell at a watermelon in an attempt to make it explode. To make things more difficult, some glass panels are placed in front of the watermelon. Each glass panel has a 5% chance to block the spell and protect the watermelon. Without any glass panels, Eugene has a 90% chance to destroy the watermelon. With a single glass panel, he has a 5% chance for the glass panel to block the spell, hence a 95% chance for it not to block the spell, and a 90% chance of destroying the watermelon if the spell gets past the glass, for a total of 95% of 90%, which is an 85.5% chance of destroying the watermelon. What is the largest number of glass panels that can be placed in front of the watermelon while still giving Eugene at least a 50% chance of destroying the watermelon?

Answer to D8: \_\_\_\_\_