

2020 AMC 10B

Time limit: 75 minutes

Typeset by:

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1 of 3 unhandled errors



Unhandled Runtime Error

Error: Hydration failed because the initial UI does not match what was rendered on the server.

See more info here:

<https://nextjs.org/docs/messages/react-hydration-error>

Call Stack

throwOnHydrationMismatch

../node_modules/react-dom/cjs/react-dom.development.js (12507:0)

tryToClaimNextHydratableInstance

../node_modules/react-dom/cjs/react-dom.development.js (12535:0)

updateHostComponent

../node_modules/react-dom/cjs/react-dom.development.js (19902:0)

beginWork

../node_modules/react-dom/cjs/react-dom.development.js (21618:0)

HTMLUnknownElement.callCallback

../node_modules/react-dom/cjs/react-dom.development.js (4164:0)

Object.invokeGuardedCallbackDev

../node_modules/react-dom/cjs/react-dom.development.js (4213:0)

invokeGuardedCallback

../node_modules/react-dom/cjs/react-dom.development.js (4277:0)

beginWork\$1

../node_modules/react-dom/cjs/react-dom.development.js (27451:0)

1. What is

A

B

C

D

E

2. Carl has

length

A

B

C

D

E

aving side

3. The ratio of w to x is $4 : 3$, the ratio of y to z is $3 : 2$, and the ratio of z to x is $1 : 6$. What is the ratio of w to y ?

A $4 : 3$

B $5 : 4$

C $8 : 3$

D $4 : 3$

E $1 : 1$

4. The acute angles a and b are supplementary. What is the value of $a + b$?

A 270°

B 180°

C 90°

D 72°

E 108°

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a and b

5. How many distinguishable arrangements are there of 1 brown tile, 1 purple tile, 2 green tiles, and 3 yellow tiles in a row from left to right? (Tiles of the same color are indistinguishable.)

A

B

C

D

E

6. Driving
This nu
hours la
average

A

B

C

D

E

51 (miles).
Then 2
as her

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7. How many positive even multiples of 3 less than 2020 are perfect squares?

A 7

B 8

C 9

D 1

E 1

8. Points P and Q are in the same plane and are not collinear with A . The area of $\triangle APQ$ is 12. What is the area of $\triangle AQR$ in this figure?

A 2

B 4

C 6

D 8

E 1

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t R in this
triangle

9. How many ordered pairs of integers (x, y) satisfy the equation

$$x^{2020} + y^2 = 2y?$$

A

B

C

D

E

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10. A three-quarter sector of a circle of radius 4 inches together with its interior can be rolled up to form the lateral surface area of a right circular cone by taping together along the two radii shown. What is the volume of the cone in cubic inches?

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A

B

C

D

E

11. Ms. Carr asks her students to read any 5 of the 10 books on a reading list. Harold randomly selects 5 books from this list, and Betty does the same. What is the probability that there are exactly 2 books that they both select?

A

B

C

D

E

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12. The decimal representation of

$$\frac{1}{20^{20}}$$

consists
several
decima

1. 23
2. 24
3. 25
4. 26
5. 27

Before
dividing

for some

It seem

Returni
 $2^{10} = 1024$

Therefo

which, by the pattern established above, implies that there are 26 zeroes after the decimal point.

1 of 3 unhandled errors

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beginWork\$1

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er k).

Thus, the correct answer is **D**.

A 23

B 2

C 2

D 2

E 2

13. Andy travels east from a point (that is, from the origin) on a number line. From that point, he travels 3 units (west is represented as a negative distance and east as a positive distance) to point A. From point A, he travels 5 units to point B. From point B, he travels 4 units to point C. From point C, he travels 6 units to point D. What is the distance between point A and point D?

A ()

B ()

C ()

D ()

E ()

1 of 3 unhandled errors

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beginWork\$1

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cing east
° left.
moves 3
sing his
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14. As shown in the figure below, six semicircles lie in the interior of a regular hexagon with side length 2 so that the diameters of the semicircles coincide with the sides of the hexagon. What is the area of the shaded region — inside the hexagon but outside all of the semicircles?

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A

B

C

D

E

15. Steve wrote the digits 1, 2, 3, 4, and 5 in order repeatedly from left to right, forming a list of 10,000 digits, beginning 123451234512...

He then erased every third digit from his list (that is, the 3rd, 6th, 9th, ... digits from the list). He then erased every fifth digit from the remaining list (that is, the 4th, 9th, 14th, ... digits from the original list). He then erased every seventh digit from the remaining list (that is, the 7th, 14th, 21st, ... digits from the original list). Finally, he erased every eleventh digit from the remaining list (that is, the 11th, 22nd, 33rd, ... digits from the original list). How many digits remain?

What is the remainder when the number of digits remaining is divided by 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000.

- A
- B
- C
- D
- E

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16. Bela and Gergely play a game on a number line. They start at 0. Bela moves the token to the right by a distance of n units, where n is a positive integer. Gergely then moves the token to the left by a distance of n units. Bela then moves the token to the right by a distance of n units, and Gergely moves the token to the left by a distance of n units. This process continues for n rounds. Bela wins if the token is at a position that is a multiple of n . Gergely wins if the token is not at a position that is a multiple of n . What is the probability that Bela wins?

- A
- B
- C
- D
- E

The real
aying,
e interval
is more
A player
yer will

17. There are 10 people standing equally spaced around a circle. Each person knows exactly 3 of the other 9 people: the 2 people standing next to her or him, as well as the person directly across the circle. How many ways are there for the 10 people to split up into 5 pairs so that the members of each pair know each other?

A

B

C

D

E

18. An urn contains 10 blue balls and 10 red balls. A ball is drawn from the urn, its color is noted, and it is returned to the urn. This process is repeated until the urn is empty. How many possible sequences of colors are there?

A

B

C

D

E

1 of 3 unhandled errors

Unhandled Runtime Error

Error: Hydration failed because the initial UI does not match what was rendered on the server.

See more info here:

<https://nextjs.org/docs/messages/react-hydration-error>

Call Stack

throwOnHydrationMismatch

../node_modules/react-dom/cjs/react-dom.development.js (12507:0)

tryToClaimNextHydratableInstance

../node_modules/react-dom/cjs/react-dom.development.js (12535:0)

updateHostComponent

../node_modules/react-dom/cjs/react-dom.development.js (19902:0)

beginWork

../node_modules/react-dom/cjs/react-dom.development.js (21618:0)

HTMLUnknownElement.callCallback

../node_modules/react-dom/cjs/react-dom.development.js (4164:0)

Object.invokeGuardedCallbackDev

../node_modules/react-dom/cjs/react-dom.development.js (4213:0)

invokeGuardedCallback

../node_modules/react-dom/cjs/react-dom.development.js (4277:0)

beginWork\$1

../node_modules/react-dom/cjs/react-dom.development.js (27451:0)

blue balls
is a ball
the box and
urn
is of each

19. In a certain card game, a player is dealt a hand of 10 cards from a deck of 52 distinct cards. The number of distinct (unordered) hands that can be dealt to the player can be written as $158A00A4A4A0$. What is the digit A ?

A

B

C

D

E

20. Let B be a set of n elements with its 2^n subsets that lie in a plane. Express the number of subsets that lie in a plane as a function of n .

where n is a positive integer.

A

B

C

D

E

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beginWork\$1

../node_modules/react-dom/cjs/react-dom.development.js (27451:0)

together
onal space
e

21. In square $ABCD$, points E and H lie on \overline{AB} and \overline{DA} , respectively, so that $AE = AH$. Points F and G lie on \overline{BC} and \overline{CD} , respectively, and points I and J lie on \overline{EH} so that $\overline{FI} \perp \overline{EH}$ and $\overline{GJ} \perp \overline{EH}$. See the figure below. Triangle AEH , quadrilateral $AEFH$, and quadrilateral $AHJG$ have the same area.

1. What is the area of triangle AEH ?

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invokeGuardedCallback

../node_modules/react-dom/cjs/react-dom.development.js (4277:0)

beginWork\$1

../node_modules/react-dom/cjs/react-dom.development.js (27451:0)

A

B

C

D

E

22. What is the remainder when $2^{202} + 202$ is divided by $2^{101} + 2^{51} + 1$?

A 100

B

C

D

E

23. Square

$A(1, 1)$

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- R ,
- H ,
- V ,

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A

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C

D

E

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../node_modules/react-dom/cjs/react-dom.development.js (4213:0)

invokeGuardedCallback
../node_modules/react-dom/cjs/react-dom.development.js (4277:0)

beginWork\$1
../node_modules/react-dom/cjs/react-dom.development.js (27451:0)

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will send
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24. How many positive integers n satisfy

$$\frac{n + 1000}{70} = \lfloor \sqrt{n} \rfloor?$$

(Recall

A

B

C

D

E

25. Let $D(x)$ be the product of the factors of x which are less than x .

where $D(1) = 1$. Find the sum of the factors of $D(2025)$ which are less than 2025.

A

B

C

D

E

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