

LEVEL 2 CHALLENGE GRADE 6 AND 7 ROUND TWO **ANSWERS**

SECTION A

- | | | | | | | | | | | | |
|----|----------|----------|----------|----------|----------|-----|----------|----------|----------|----------|----------|
| 1. | A | B | C | D | E | 9. | A | B | C | D | E |
| 2. | A | B | C | D | E | 10. | A | B | C | D | E |
| 3. | A | B | C | D | E | 11. | A | B | C | D | E |
| 4. | A | B | C | D | E | 12. | A | B | C | D | E |
| 5. | A | B | C | D | E | 13. | A | B | C | D | E |
| 6. | A | B | C | D | E | 14. | A | B | C | D | E |
| 7. | A | B | C | D | E | 15. | A | B | C | D | E |
| 8. | A | B | C | D | E | | | | | | |

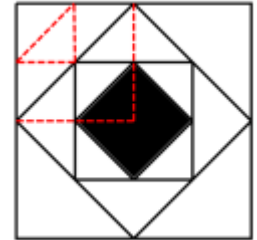
SECTION B

16. 6
17. 15
18. 15
19. 6
20. 5

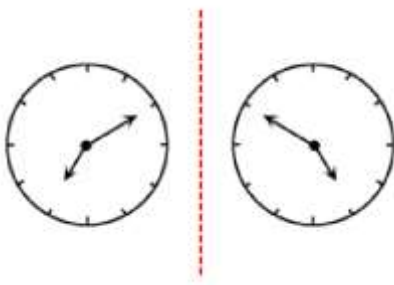
SECTION A

1. **B** The prime numbers less than 23 are 2, 3, 5, 7, 11, 13, 17, and 19. Doubling and subtracting we get 3, 5, 9, 13, 21, 25, 33, and 37 respectively. The Superprimes are then 2, 3, 7 and 19, the sum of which is 31.
2. **E** The largest possible number using the digits of 2016 is 6210 and the smallest is 1026. $6210 - 1026 = 5184$.

3. **B** Dividing the area as shown alongside we get the fraction shaded to be $\frac{4}{32} = \frac{1}{8}$.



4. **D**



To visualize the actual time we would need to reflect the image in mirror over a vertical axis. Therefore, the actual time is 4:50.

5. **A** $\frac{1000}{100} \times 4 = 40$.

6. **C** $500 \times 12 = 6000$ cm $6000 \div 100 = 60$ m

7. **D** 2016 is a multiple of 7. The only multiple of 7 listed is $105 = 15 \times 7$.

8. **B** $3P = 27 \Rightarrow P = 9$.
 $2 + 7 + 2Q = 9 \Rightarrow 2Q = 0 \Rightarrow Q = 5$.
 $P + Q = 9 + 5 = 14$.

9. **C** Let the pumpkins be x , y and z .

$$\begin{cases} x + y = 12 \\ x + z = 13 \Rightarrow 2x + 2y + 2z = 40 \Rightarrow x + y + z = 20 \\ y + z = 15 \end{cases}$$

$$\therefore z = 8, x = 5 \text{ and } y = 7.$$

The lightest pumpkin weighs 5kgs.

10. **E**



11. C Let the number of rows be x and the number of cars in each row be y .

$$\therefore xy - (x+1)(y-1) = 1$$

$$\therefore x - y = 0$$

$$\therefore x = y$$

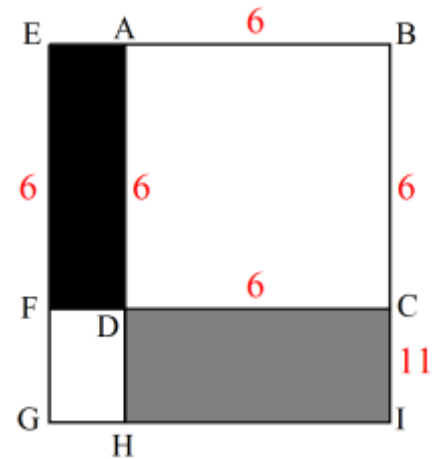
If $x = y \Rightarrow xy = x^2$. Therefore, the number of cars is a perfect square.

12. A If A is true B must be true. If B is true, then E is false which means A is true.

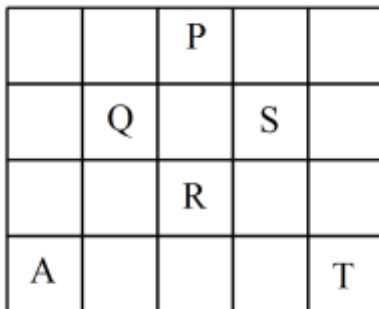
13. D Let the possible dimensions of EADF be 6×7 .

This corresponds to the dimensions of DCHI being 6×11 .

Since ABCD is a square, its area is 36cm^2 .



14. E

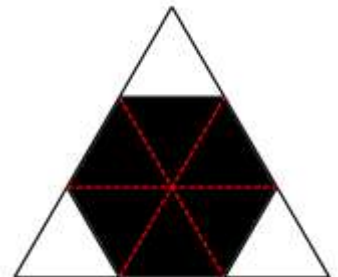


If S is the starting position we can reach position R immediately. From S we can also reach P and then W and Q in sequence. To reach position T, it would have to be reached from the upper right or upper left square. There is no way for us to reach these two squares unless we are allowed to move outside the large square which is not permitted.

15. B The triangle can be divided into 9 congruent triangles.

The hexagon covers 6 such triangles $\Rightarrow 30 \div 6 = 5\text{ cm}^2$.

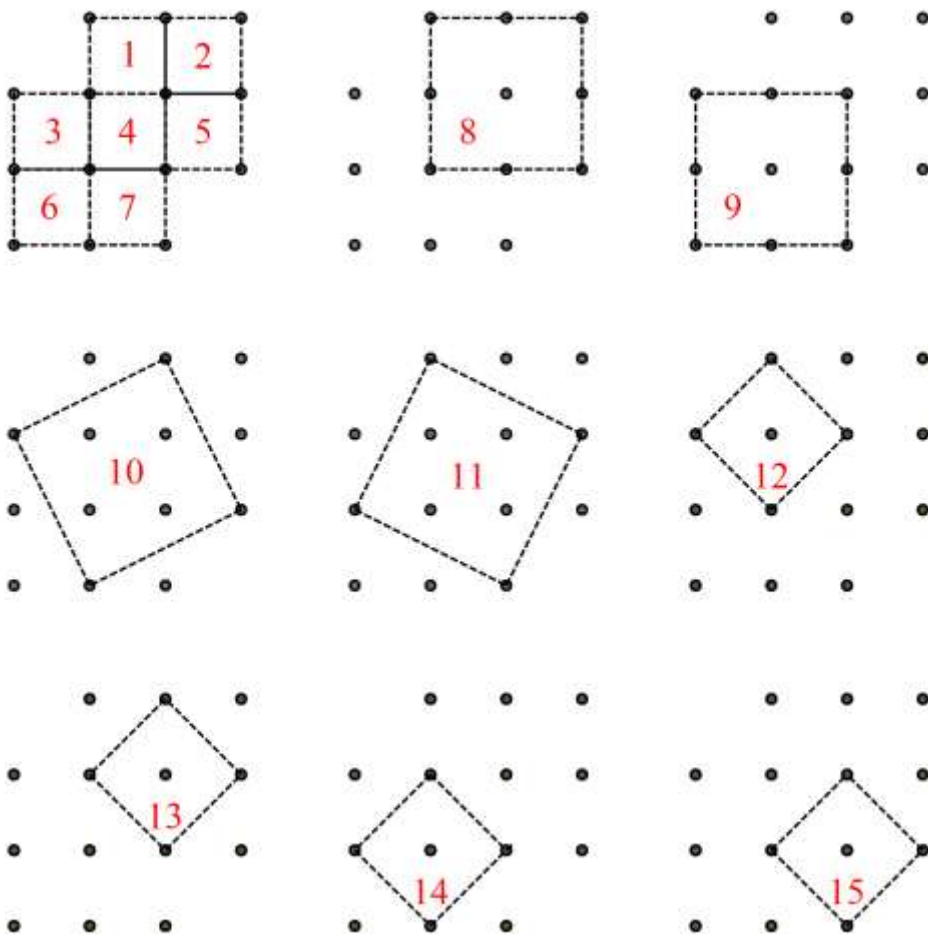
$$5 \times 9 = 45\text{ cm}^2.$$



SECTION B

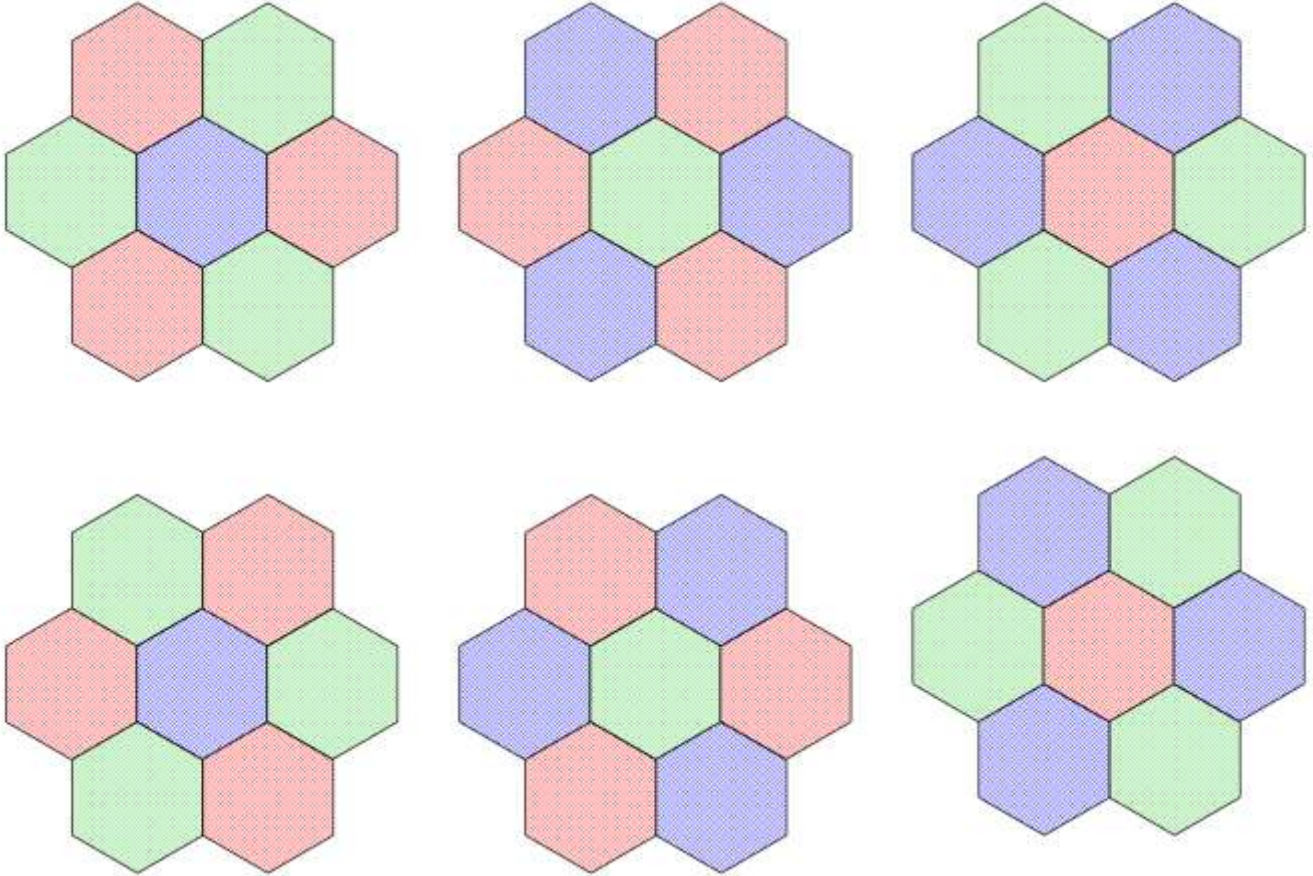
- 16.** A number is divisible by 3 if the sum of the digits is divisible by 3.
 A number is divisible by 8 if the last three digits form a number divisible by 8.
 The first multiple of 8 using the digits 1 and 2 is 8, 16, 24, ...96, 104, 112.
 Thus, to be divisible by 3 we will want the four-digit number 2112.
 $\therefore 2+1+1+2=6$

17.

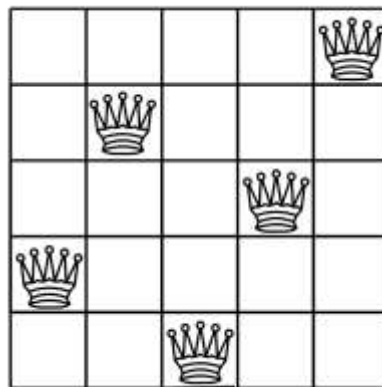


- 18.** For two-digit numbers, the largest digit sum is 18, which only occurs for the two digit number 99. But, $99 \div 18$ has a remainder of 9. This rules out 17 as a possible answer for the largest remainder. The digit sum 17 occurs only for the numbers 98 and 89. But, $98 \div 17$ has a remainder of 12 and $89 \div 17$ has a remainder of 4, which then rules out 16 as a possible answer. The digit sum 16 occurs only for numbers 97, 88 and 79. Testing these, we find that $97 \div 16$ has a remainder of 1, $88 \div 16$ has a remainder of 8 and $79 \div 16$ has remainder of 15. Therefore, the largest remainder is 15.

19.



20.



Interestingly, a $n \times n$ chessboard will require n queens to attack every space. There are many symmetries to the above example.