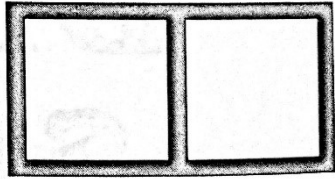


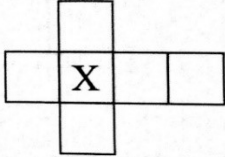
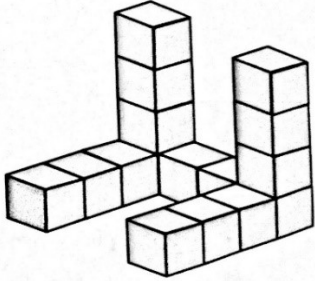
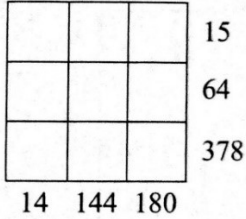
# Exam for Grade 4

Exam Date: 8<sup>th</sup> Jan 2022

<b>A</b>  3 Points	What is the value of $N$ that makes the sentence true? $1 + 2 + 3 + 4 + 5 + 5 = 3 \times N$
<b>B</b>  5 Points	Madison has five stickers in a row on a piece of paper. The star is one to the left of the puppy. The rainbow is to the right of the heart. The puppy is three to the left of the kitten. Which sticker is in the middle of the row?
<b>C</b>  7 Points	For a certain 3-digit number: <ul style="list-style-type: none"><li>• the digits are in increasing order</li><li>• the difference of the greatest and least digits is 7</li><li>• it is a multiple of 9 and greater than 200.</li></ul> Find the 3-digit number.
<b>D</b>  10 Points	Two square gardens are each 10 m by 10 m. They are enclosed by a sidewalk of width 1 m. There is also a shared sidewalk of width 1 m between gardens (as shown). Find the total area, in square meters, of the sidewalks. 
<b>E</b>  11 Points	In the multiplication problem at the right, each letter represents a different digit. What 4-digit number is represented by MATH? <div style="text-align: right;"><math display="block">\begin{array}{r} \text{MATH} \\ \times 4 \\ \hline \text{HTAM} \end{array}</math></div>

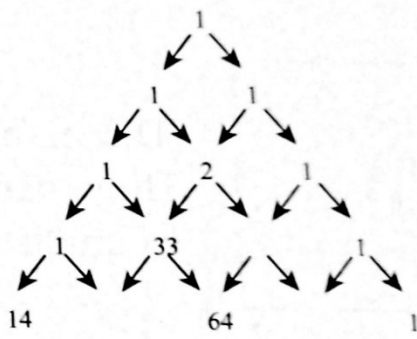
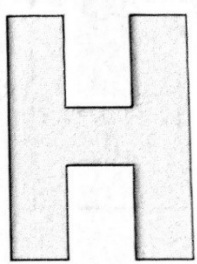
# Exam for Grade 5

Exam Date: 8<sup>th</sup> January 2022

<p><b>A</b></p> <p>5 Points</p>	<p>In the grid shown, the numbers 1, 2, 3, 4, 5, and 6 are to be placed, one per square. The sum of the numbers in the row going across is 11. The sum of the numbers in the column going down is also 11. What is the number in the box with the X?</p> 
<p><b>B</b></p> <p>7 Points</p>	<p>The number 6 has exactly four unique factors: 1, 2, 3, and 6. How many counting numbers less than 20 have an <i>odd</i> number of unique factors?</p>
<p><b>C</b></p> <p>7 Points</p>	<p>For the first half of the season, Alpha team won <math>\frac{2}{3}</math> of their meets. For the second half of the season, they won <math>\frac{3}{4}</math> of their meets. If both halves of the season had the same number of games, what is the fewest possible number of wins that they have?</p>
<p><b>D</b></p> <p>10 Points</p>	<p>Sixteen 1 cm by 1 cm by 1 cm cubes are glued together, face-to-face, as shown. The object is then entirely painted red. What is the total area, in sq cm, of all of the red painted surfaces?</p> 
<p><b>E</b></p> <p>10 Points</p>	<p>The numbers from 1 through 9 are placed in the grid, exactly one per box without repeats. The numbers shown at the end of each row are the products of the numbers in that row. The numbers shown at the bottom of each column are the products of the numbers in that column. What is the sum of the numbers in the four corners of the 3 by 3 grid?</p> 

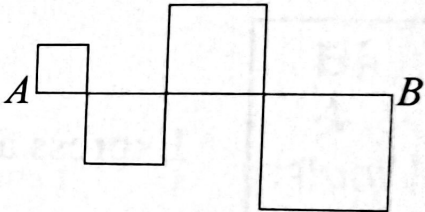
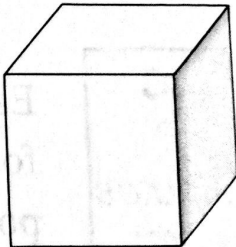
# Exam for Grade 6

Exam Date: 8<sup>th</sup> January 2022

<b>A</b>  7 Points	In a class of 27 students, 16 like video games and 20 like cartoons. If 12 students like <i>both</i> video games and cartoons, how many students do not like either?
<b>B</b>  7 Points	<p>Pascal's Triangle is shown here. The first and last number in each row is 1. Each of the other numbers is the sum of the two numbers diagonally above it, as shown by the arrows. Five rows are shown. If the pattern is continued for two more rows, what is the sum of all seven number in that row?</p> 
<b>C</b>  8 Points	<p>In the figure shown, the “H” has been formed by removing two <math>2 \times 4</math> rectangles from the top middle and bottom middle of a <math>6 \times 10</math> rectangle. The “H” is to be completely tiled with <math>1 \times 1</math> tiles, which come in boxes of 6. What is the fewest number of boxes of tiles that must be bought to tile the “H”?</p> 
<b>D</b>  10 Points	The girls on a softball team are sharing a bag of fresh strawberries. If every girl has 5 whole strawberries, there are 3 left over. If, instead, the girls decide to share the strawberries evenly among themselves and their four coaches, and everyone takes 4 whole strawberries each, there are none left over. How many girls are on the softball team?
<b>E</b>  10 Points	The ten-digit number $3872649A0B$ is divisible by 36. The letters $A$ and $B$ each represent single digit even numbers. Find the sum $A + B$ .

# Exam for Grade 7

Exam Date: 8<sup>th</sup> January 2022

<b>A</b>  5 Points	Three vertices of a parallelogram have coordinates A(-3, -5), B(-1, 2) and C(11, 4). The fourth vertex lies in quadrant IV. Find its coordinates expressed as an ordered pair.
<b>B</b>  7 Points	A single strand of wire is bent into four squares as seen in the diagram. If the distance from A to B is 12, find the length of the strand of wire used to construct the figure. 
<b>C</b>  9 Points	The cube in the diagram is cut into eight identical smaller cubes whose total surface area is $K$ times the surface area of the original larger cube. Find $K$ . 
<b>D</b>  9 Points	Find the sum of all integer values of $x$ for which: $(x - 5)^{x+2} = 1$ .
<b>E</b>  10 Points	Seven cards are face-down on a table. Each of the cards has exactly one of the numbers 1, 2, 4, 6, 7, 8, and 10 facing down. No two cards have the same number on it. Two cards are randomly selected and turned over. What is the probability that their sum is a multiple of 3? [Express your answer as a fraction in lowest terms]

# Exam for Grade 8

Exam Date: 8<sup>th</sup> January 2022

<b>A</b>  5 Points	Suppose today is Monday. What day of the week will it be 2014 days later?									
<b>B</b>  7 Points	The product of some whole numbers is 40. Find their least possible sum.									
<b>C</b>  8 Points	The five points $P$ , $Q$ , $R$ , $S$ , and $T$ lie on a straight line, though not necessarily in order. Suppose $PT = 20$ , and $Q$ is $\frac{4}{5}$ of the way from $P$ to $T$ . Additionally, $R$ (between $P$ and $Q$ ) is 4 units closer to $P$ to $T$ . Additionally, $R$ (between $P$ and $Q$ ) is 4 units closer to $P$ than to $Q$ , and $S$ is twice as far from $P$ as it is from $R$ . Find the sum of the two possible lengths of line segment $\overline{RS}$ .									
<b>D</b>  9 Points	In the square array shown, each row, column, and diagonal has the same sum. Find the numerical sum $a + b + c + d + e + f$ . <table border="1"><tr><td>4</td><td><math>a</math></td><td><math>b</math></td></tr><tr><td><math>c</math></td><td>7</td><td><math>d</math></td></tr><tr><td><math>e</math></td><td>4</td><td><math>f</math></td></tr></table>	4	$a$	$b$	$c$	7	$d$	$e$	4	$f$
4	$a$	$b$								
$c$	7	$d$								
$e$	4	$f$								
<b>E</b>  10 Points	There are exactly <i>three</i> fractions $\frac{a}{b}$ in lowest terms having both of the following properties: (1) $\frac{1}{5} < \frac{a}{b} < \frac{1}{4}$ and (2) $b$ is odd, with $10 < b < 20$ . Find all <i>three</i> fractions that satisfy both conditions.									