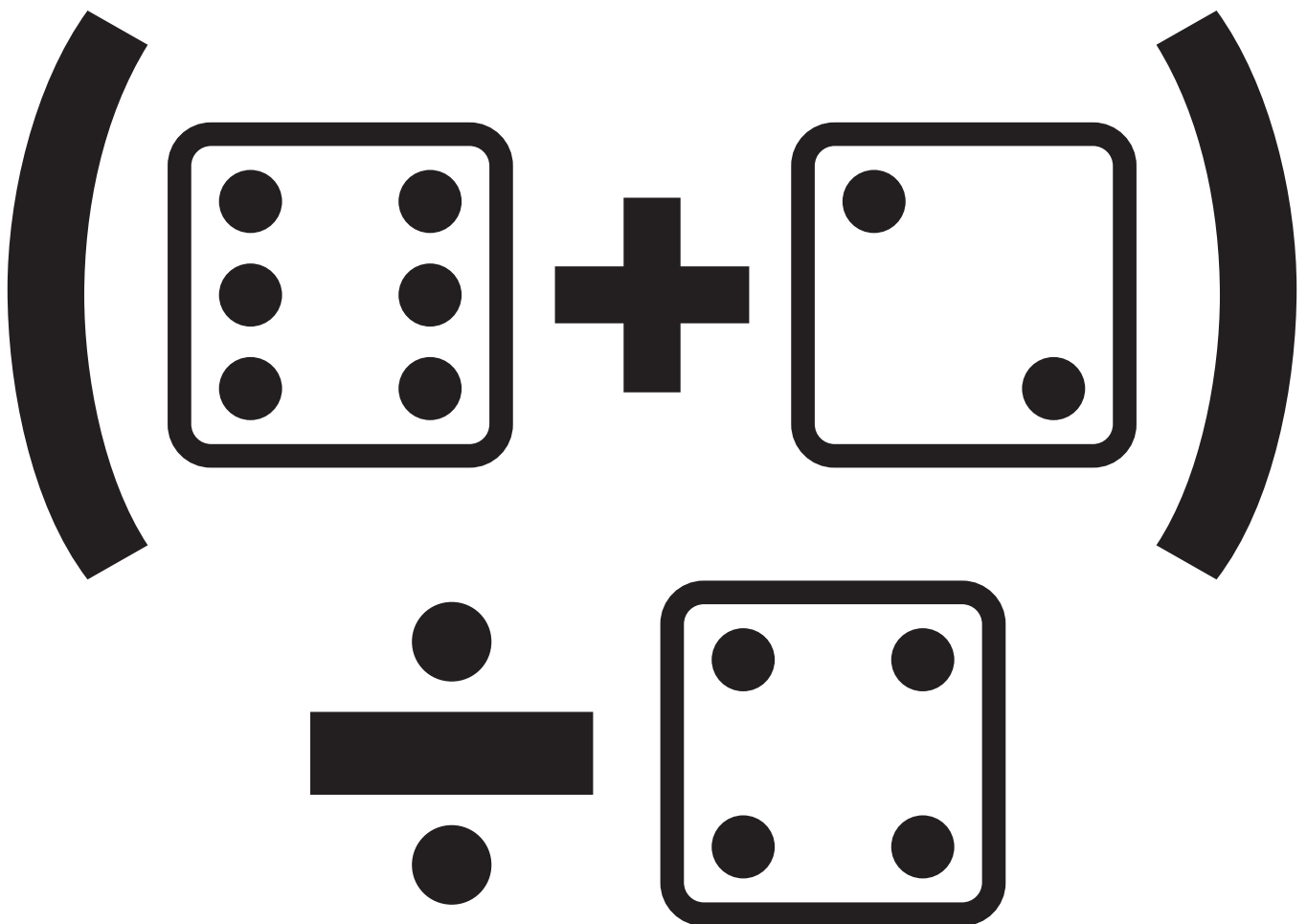


Dice Activities for Division

Quotients • Factors • Remainders



Mary Saltus, Diane Neison,
Chet Delani

Division Chart

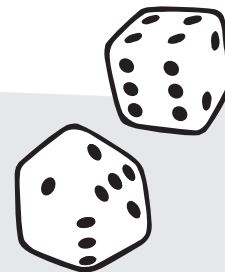
$0 \div 1 = 0$ $1 \div 1 = 1$ $2 \div 1 = 2$ $3 \div 1 = 3$ $4 \div 1 = 4$ $5 \div 1 = 5$ $6 \div 1 = 6$ $7 \div 1 = 7$ $8 \div 1 = 8$ $9 \div 1 = 9$ $10 \div 1 = 10$ $11 \div 1 = 11$ $12 \div 1 = 12$	$0 \div 2 = 0$ $2 \div 2 = 1$ $4 \div 2 = 2$ $6 \div 2 = 3$ $8 \div 2 = 4$ $10 \div 2 = 5$ $12 \div 2 = 6$ $14 \div 2 = 7$ $16 \div 2 = 8$ $18 \div 2 = 9$ $20 \div 2 = 10$ $22 \div 2 = 11$ $24 \div 2 = 12$	$0 \div 3 = 0$ $3 \div 3 = 1$ $6 \div 3 = 2$ $9 \div 3 = 3$ $12 \div 3 = 4$ $15 \div 3 = 5$ $18 \div 3 = 6$ $21 \div 3 = 7$ $24 \div 3 = 8$ $27 \div 3 = 9$ $30 \div 3 = 10$ $33 \div 3 = 11$ $36 \div 3 = 12$	$0 \div 4 = 0$ $4 \div 4 = 1$ $8 \div 4 = 2$ $12 \div 4 = 3$ $16 \div 4 = 4$ $20 \div 4 = 5$ $24 \div 4 = 6$ $28 \div 4 = 7$ $32 \div 4 = 8$ $36 \div 4 = 9$ $40 \div 4 = 10$ $44 \div 4 = 11$ $48 \div 4 = 12$	$0 \div 5 = 0$ $5 \div 5 = 1$ $10 \div 5 = 2$ $15 \div 5 = 3$ $20 \div 5 = 4$ $25 \div 5 = 5$ $30 \div 5 = 6$ $35 \div 5 = 7$ $40 \div 5 = 8$ $45 \div 5 = 9$ $50 \div 5 = 10$ $55 \div 5 = 11$ $60 \div 5 = 12$	$0 \div 6 = 0$ $6 \div 6 = 1$ $12 \div 6 = 2$ $18 \div 6 = 3$ $24 \div 6 = 4$ $30 \div 6 = 5$ $36 \div 6 = 6$ $42 \div 6 = 7$ $48 \div 6 = 8$ $54 \div 6 = 9$ $60 \div 6 = 10$ $66 \div 6 = 11$ $72 \div 6 = 12$	$0 \div 7 = 0$ $7 \div 7 = 1$ $14 \div 7 = 2$ $21 \div 7 = 3$ $28 \div 7 = 4$ $35 \div 7 = 5$ $42 \div 7 = 6$ $49 \div 7 = 7$ $56 \div 7 = 8$ $63 \div 7 = 9$ $70 \div 7 = 10$ $77 \div 7 = 11$ $84 \div 7 = 12$	$0 \div 8 = 0$ $8 \div 8 = 1$ $16 \div 8 = 2$ $24 \div 8 = 3$ $32 \div 8 = 4$ $40 \div 8 = 5$ $48 \div 8 = 6$ $56 \div 8 = 7$ $64 \div 8 = 8$ $72 \div 8 = 9$ $80 \div 8 = 10$ $88 \div 8 = 11$ $96 \div 8 = 12$	$0 \div 9 = 0$ $9 \div 9 = 1$ $18 \div 9 = 2$ $27 \div 9 = 3$ $36 \div 9 = 4$ $45 \div 9 = 5$ $54 \div 9 = 6$ $63 \div 9 = 7$ $72 \div 9 = 8$ $81 \div 9 = 9$ $90 \div 9 = 10$ $99 \div 9 = 11$ $108 \div 9 = 12$	$0 \div 10 = 0$ $10 \div 10 = 1$ $20 \div 10 = 2$ $30 \div 10 = 3$ $40 \div 10 = 4$ $50 \div 10 = 5$ $60 \div 10 = 6$ $70 \div 10 = 7$ $80 \div 10 = 8$ $90 \div 10 = 9$ $100 \div 10 = 10$ $110 \div 10 = 11$ $120 \div 10 = 12$	$0 \div 11 = 0$ $11 \div 11 = 1$ $22 \div 11 = 2$ $33 \div 11 = 3$ $44 \div 11 = 4$ $55 \div 11 = 5$ $66 \div 11 = 6$ $77 \div 11 = 7$ $88 \div 11 = 8$ $99 \div 11 = 9$ $110 \div 11 = 10$ $121 \div 11 = 11$ $132 \div 11 = 12$	$0 \div 12 = 0$ $12 \div 12 = 1$ $24 \div 12 = 2$ $36 \div 12 = 3$ $48 \div 12 = 4$ $60 \div 12 = 5$ $72 \div 12 = 6$ $84 \div 12 = 7$ $96 \div 12 = 8$ $108 \div 12 = 9$ $120 \div 12 = 10$ $132 \div 12 = 11$ $144 \div 12 = 12$
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Directions for the Chart Activities –

Four in a Row, Square Off, Cross Over

Objectives

- Develop a working knowledge of the mathematical concepts of division.
- Practice division facts 2 through 12.
- Recognize and reinforce factors.
- Analyze opponent's possible moves to develop a blocking strategy.
- Identify the role of luck versus skill in an activity using dice.
- Develop communication and cooperation skills by working in teams of two students.



Introduce the **Four in a Row**, **Square Off**, and **Cross Over** activities by demonstrating on an overhead or interactive whiteboard and playing against the class. Two teams with two students on a team are suggested. Teams give students an opportunity to discuss moves and strategies and provide a check on correct computation.

How to Play

See next page.

Discussion

Four in a Row

- This activity is similar to the games Othello and Pente, in which defense is important. How does the toss of the dice influence strategy? Is this activity more a game of defense or offense?
- Does this activity involve more luck or skill?
- Keep a record of each dice toss. Which combinations were tossed the most? The least?

Square Off

- Is this more a game of luck or skill?
- Is there more of an opportunity in **Square Off** than in **Four in a Row** or **Cross Over** to play defensively—that is, to prevent the opposing team from forming a square? Why?
- What strategies have you and your teammate learned from each other?
- Would you prefer to play these games with a partner or without? Why?

Cross Over

- Is this more a game of luck or skill?
- Which of the three activities—**Square Off**, **Four in a Row**, or **Cross Over**—offers more opportunities to block the other team? Why?
- Do you play more offensively or defensively? Why? Is one strategy more effective? What happens if you and your opponent both play defensively?

Directions for Four in a Row

How to Play

- Each team tosses a die. The higher number goes first.
 - Taking turns, the teams toss two dice and find the sum. The sum is the quotient of a division equation on the chart. Place a token on the quotient.
 - The object of the game is to line up four tokens, vertically, horizontally, or diagonally before the opposing team does.
 - First team to line up four tokens wins.
-

Directions for Square Off

How to Play

- Each team tosses a die. The higher number goes first.
 - Taking turns, teams toss two dice and find the sum. The sum is the quotient of a division equation on the chart. Place a token on the quotient.
 - The object of the game is to place four tokens on the chart so that they form any size square, 2-by-2, 3-by-3, 4-by-4, and so on. Orientation of the square can be on the diagonal.
 - The first team to form three squares wins.
-

Directions for Cross Over

How to Play

- Each team tosses a die. The higher number goes first.
- Taking turns, teams toss two dice and find the sum. The sum is the quotient of a division equation on the chart. Place a token on the quotient.
- The object of the game is to place your tokens so they form a continuous path zigzagging vertically, horizontally, or diagonally from space to adjacent space from one side of the chart to the other. If the quotient is taken, lose a turn.
- The first team to form a continuous path across the chart wins.

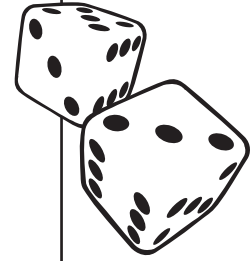
Variation:

- Start play in either the outside right or outside left column of the chart. If no box in either column contains the quotient of your team's first dice toss, lose a turn.
- If the opposing team does place a token on an outside column box, your team must place a token in a box on the *opposite* outside column.
- You may not place a token on an *occupied* box.
- The first team to reach the opposite side wins.

÷ 2 Game Chart

How to Play

- Use this chart for **Four in a Row, Square Off, and Cross Over.**
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “18 has how many sets of 2?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

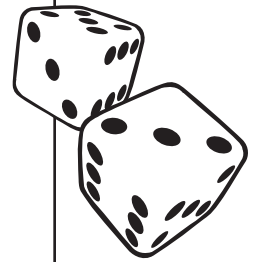


$18 \div 2$	$20 \div 2$	$22 \div 2$	$10 \div 2$	$16 \div 2$	$8 \div 2$	$14 \div 2$
$4 \div 2$	$24 \div 2$	$14 \div 2$	$6 \div 2$	$8 \div 2$	$14 \div 2$	$16 \div 2$
$22 \div 2$	$18 \div 2$	$14 \div 2$	$22 \div 2$	$20 \div 2$	$12 \div 2$	$10 \div 2$
$10 \div 2$	$6 \div 2$	$20 \div 2$	$16 \div 2$	$12 \div 2$	$18 \div 2$	$12 \div 2$
$6 \div 2$	$8 \div 2$	$12 \div 2$	$18 \div 2$	$10 \div 2$	$14 \div 2$	$8 \div 2$
$14 \div 2$	$20 \div 2$	$16 \div 2$	$4 \div 2$	$12 \div 2$	$24 \div 2$	$20 \div 2$
$16 \div 2$	$8 \div 2$	$24 \div 2$	$10 \div 2$	$14 \div 2$	$18 \div 2$	$6 \div 2$

÷ 3 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “27 has how many sets of 3?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

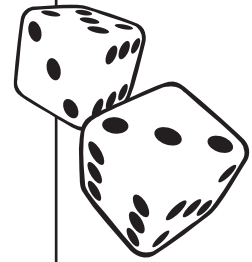


$27 \div 3$	$30 \div 3$	$33 \div 3$	$15 \div 3$	$24 \div 3$	$12 \div 3$	$18 \div 3$
$6 \div 3$	$36 \div 3$	$21 \div 3$	$9 \div 3$	$12 \div 3$	$21 \div 3$	$24 \div 3$
$9 \div 3$	$27 \div 3$	$21 \div 3$	$6 \div 3$	$30 \div 3$	$33 \div 3$	$15 \div 3$
$15 \div 3$	$30 \div 3$	$12 \div 3$	$21 \div 3$	$18 \div 3$	$27 \div 3$	$18 \div 3$
$24 \div 3$	$12 \div 3$	$18 \div 3$	$27 \div 3$	$15 \div 3$	$21 \div 3$	$36 \div 3$
$21 \div 3$	$33 \div 3$	$9 \div 3$	$6 \div 3$	$18 \div 3$	$24 \div 3$	$30 \div 3$
$24 \div 3$	$12 \div 3$	$36 \div 3$	$15 \div 3$	$21 \div 3$	$27 \div 3$	$9 \div 3$

÷ 4 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “28 has how many sets of 4?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

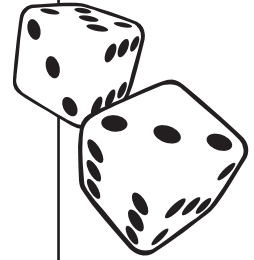


$28 \div 4$	$40 \div 4$	$48 \div 4$	$20 \div 4$	$24 \div 4$	$12 \div 4$	$16 \div 4$
$8 \div 4$	$36 \div 4$	$32 \div 4$	$48 \div 4$	$16 \div 4$	$28 \div 4$	$24 \div 4$
$28 \div 4$	$44 \div 4$	$28 \div 4$	$20 \div 4$	$8 \div 4$	$36 \div 4$	$16 \div 4$
$20 \div 4$	$48 \div 4$	$40 \div 4$	$24 \div 4$	$28 \div 4$	$32 \div 4$	$36 \div 4$
$32 \div 4$	$12 \div 4$	$44 \div 4$	$36 \div 4$	$40 \div 4$	$8 \div 4$	$20 \div 4$
$40 \div 4$	$32 \div 4$	$24 \div 4$	$28 \div 4$	$16 \div 4$	$44 \div 4$	$40 \div 4$
$20 \div 4$	$12 \div 4$	$36 \div 4$	$16 \div 4$	$24 \div 4$	$28 \div 4$	$32 \div 4$

÷ 5 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means "has how many." Example: "35 has how many sets of 5?"
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

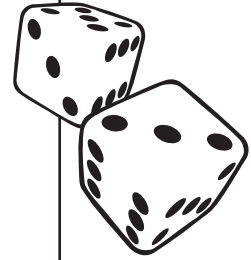


$35 \div 5$	$50 \div 5$	$55 \div 5$	$25 \div 5$	$30 \div 5$	$15 \div 5$	$20 \div 5$
$10 \div 5$	$45 \div 5$	$40 \div 5$	$60 \div 5$	$20 \div 5$	$45 \div 5$	$35 \div 5$
$30 \div 5$	$50 \div 5$	$10 \div 5$	$25 \div 5$	$40 \div 5$	$50 \div 5$	$20 \div 5$
$20 \div 5$	$60 \div 5$	$25 \div 5$	$30 \div 5$	$35 \div 5$	$40 \div 5$	$45 \div 5$
$35 \div 5$	$15 \div 5$	$55 \div 5$	$45 \div 5$	$50 \div 5$	$35 \div 5$	$30 \div 5$
$40 \div 5$	$10 \div 5$	$30 \div 5$	$35 \div 5$	$20 \div 5$	$15 \div 5$	$50 \div 5$
$25 \div 5$	$55 \div 5$	$45 \div 5$	$25 \div 5$	$35 \div 5$	$60 \div 5$	$40 \div 5$

÷ 6 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “36 has how many sets of 6?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

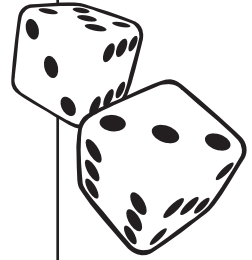


$36 \div 6$	$12 \div 6$	$54 \div 6$	$24 \div 6$	$66 \div 6$	$18 \div 6$	$42 \div 6$
$60 \div 6$	$48 \div 6$	$30 \div 6$	$72 \div 6$	$42 \div 6$	$54 \div 6$	$36 \div 6$
$42 \div 6$	$66 \div 6$	$48 \div 6$	$30 \div 6$	$12 \div 6$	$60 \div 6$	$24 \div 6$
$24 \div 6$	$72 \div 6$	$60 \div 6$	$36 \div 6$	$42 \div 6$	$48 \div 6$	$18 \div 6$
$30 \div 6$	$54 \div 6$	$42 \div 6$	$54 \div 6$	$60 \div 6$	$42 \div 6$	$30 \div 6$
$48 \div 6$	$12 \div 6$	$36 \div 6$	$42 \div 6$	$24 \div 6$	$66 \div 6$	$60 \div 6$
$24 \div 6$	$18 \div 6$	$54 \div 6$	$30 \div 6$	$36 \div 6$	$72 \div 6$	$48 \div 6$

÷ 7 Game Chart

How to Play

- Use this chart for **Four in a Row, Square Off, and Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “35 has how many sets of 7?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

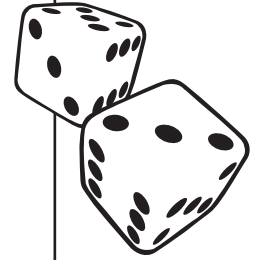


$35 \div 7$	$70 \div 7$	$56 \div 7$	$21 \div 7$	$63 \div 7$	$28 \div 7$	$42 \div 7$
$14 \div 7$	$49 \div 7$	$35 \div 7$	$63 \div 7$	$28 \div 7$	$84 \div 7$	$56 \div 7$
$42 \div 7$	$63 \div 7$	$49 \div 7$	$70 \div 7$	$21 \div 7$	$49 \div 7$	$84 \div 7$
$21 \div 7$	$77 \div 7$	$49 \div 7$	$56 \div 7$	$42 \div 7$	$35 \div 7$	$56 \div 7$
$70 \div 7$	$14 \div 7$	$63 \div 7$	$35 \div 7$	$28 \div 7$	$42 \div 7$	$77 \div 7$
$49 \div 7$	$77 \div 7$	$28 \div 7$	$42 \div 7$	$14 \div 7$	$63 \div 7$	$49 \div 7$
$28 \div 7$	$35 \div 7$	$56 \div 7$	$70 \div 7$	$49 \div 7$	$84 \div 7$	$70 \div 7$

÷ 8 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “32 has how many sets of 8?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

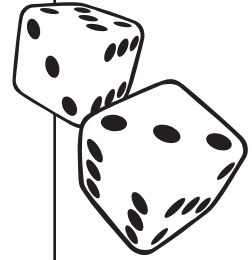


$32 \div 8$	$80 \div 8$	$56 \div 8$	$24 \div 8$	$88 \div 8$	$16 \div 8$	$80 \div 8$
$16 \div 8$	$40 \div 8$	$80 \div 8$	$72 \div 8$	$64 \div 8$	$56 \div 8$	$32 \div 8$
$56 \div 8$	$88 \div 8$	$48 \div 8$	$40 \div 8$	$72 \div 8$	$80 \div 8$	$24 \div 8$
$24 \div 8$	$72 \div 8$	$32 \div 8$	$64 \div 8$	$40 \div 8$	$48 \div 8$	$56 \div 8$
$40 \div 8$	$48 \div 8$	$64 \div 8$	$96 \div 8$	$56 \div 8$	$72 \div 8$	$96 \div 8$
$80 \div 8$	$32 \div 8$	$48 \div 8$	$56 \div 8$	$64 \div 8$	$88 \div 8$	$64 \div 8$
$96 \div 8$	$16 \div 8$	$56 \div 8$	$40 \div 8$	$32 \div 8$	$72 \div 8$	$48 \div 8$

÷ 9 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “81 has how many sets of 9?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.



$81 \div 9$	$63 \div 9$	$54 \div 9$	$27 \div 9$	$99 \div 9$	$18 \div 9$	$45 \div 9$
$108 \div 9$	$45 \div 9$	$90 \div 9$	$72 \div 9$	$81 \div 9$	$54 \div 9$	$36 \div 9$
$54 \div 9$	$63 \div 9$	$45 \div 9$	$36 \div 9$	$72 \div 9$	$90 \div 9$	$108 \div 9$
$18 \div 9$	$72 \div 9$	$36 \div 9$	$63 \div 9$	$54 \div 9$	$99 \div 9$	$81 \div 9$
$63 \div 9$	$81 \div 9$	$63 \div 9$	$27 \div 9$	$90 \div 9$	$72 \div 9$	$99 \div 9$
$90 \div 9$	$36 \div 9$	$45 \div 9$	$54 \div 9$	$81 \div 9$	$108 \div 9$	$63 \div 9$
$27 \div 9$	$18 \div 9$	$63 \div 9$	$90 \div 9$	$36 \div 9$	$72 \div 9$	$45 \div 9$

÷ 10 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “100 has how many sets of 10?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.



$100 \div 10$	$70 \div 10$	$120 \div 10$	$50 \div 10$	$80 \div 10$	$60 \div 10$	$30 \div 10$
$80 \div 10$	$20 \div 10$	$90 \div 10$	$110 \div 10$	$40 \div 10$	$100 \div 10$	$70 \div 10$
$50 \div 10$	$90 \div 10$	$70 \div 10$	$30 \div 10$	$90 \div 10$	$60 \div 10$	$120 \div 10$
$40 \div 10$	$60 \div 10$	$80 \div 10$	$100 \div 10$	$70 \div 10$	$50 \div 10$	$80 \div 10$
$110 \div 10$	$90 \div 10$	$50 \div 10$	$60 \div 10$	$20 \div 10$	$70 \div 10$	$40 \div 10$
$70 \div 10$	$40 \div 10$	$80 \div 10$	$120 \div 10$	$60 \div 10$	$30 \div 10$	$100 \div 10$
$20 \div 10$	$100 \div 10$	$90 \div 10$	$70 \div 10$	$40 \div 10$	$110 \div 10$	$50 \div 10$

÷ 11 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “110 has how many sets of 11?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.



$110 \div 11$	$77 \div 11$	$132 \div 11$	$55 \div 11$	$88 \div 11$	$66 \div 11$	$33 \div 11$
$88 \div 11$	$22 \div 11$	$99 \div 11$	$121 \div 11$	$44 \div 11$	$110 \div 11$	$77 \div 11$
$55 \div 11$	$99 \div 11$	$77 \div 11$	$33 \div 11$	$99 \div 11$	$66 \div 11$	$132 \div 11$
$44 \div 11$	$66 \div 11$	$88 \div 11$	$110 \div 11$	$77 \div 11$	$55 \div 11$	$88 \div 11$
$121 \div 11$	$99 \div 11$	$55 \div 11$	$66 \div 11$	$22 \div 11$	$77 \div 11$	$44 \div 11$
$77 \div 11$	$44 \div 11$	$88 \div 11$	$132 \div 11$	$66 \div 11$	$33 \div 11$	$110 \div 11$
$22 \div 11$	$110 \div 11$	$99 \div 11$	$77 \div 11$	$44 \div 11$	$121 \div 11$	$55 \div 11$

÷ 12 Game Chart

How to Play

- Use this chart for **Four in a Row**, **Square Off**, and **Cross Over**.
- Each team tosses a die. Higher number goes first.
- Toss two dice and find the sum. The sum is the quotient of a division equation on the chart.
- Remember that \div means “has how many.” Example: “120 has how many sets of 12?”
- Place a token on the equation. If the equation is not available, lose a turn.
- First team to place tokens according to the rules of the game being played wins.

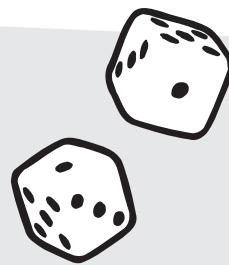


$120 \div 12$	$84 \div 12$	$144 \div 12$	$60 \div 12$	$96 \div 12$	$72 \div 12$	$36 \div 12$
$96 \div 12$	$24 \div 12$	$108 \div 12$	$132 \div 12$	$48 \div 12$	$120 \div 12$	$84 \div 12$
$60 \div 12$	$108 \div 12$	$84 \div 12$	$36 \div 12$	$108 \div 12$	$72 \div 12$	$144 \div 12$
$48 \div 12$	$72 \div 12$	$96 \div 12$	$120 \div 12$	$84 \div 12$	$60 \div 12$	$96 \div 12$
$132 \div 12$	$108 \div 12$	$60 \div 12$	$72 \div 12$	$24 \div 12$	$84 \div 12$	$48 \div 12$
$84 \div 12$	$48 \div 12$	$96 \div 12$	$144 \div 12$	$72 \div 12$	$36 \div 12$	$120 \div 12$
$24 \div 12$	$120 \div 12$	$108 \div 12$	$84 \div 12$	$48 \div 12$	$132 \div 12$	$60 \div 12$

Directions for Remainder Activities

Objectives

- Practice computing remainders.
- Practice identifying what numbers will result in the highest and lowest remainders.
- Practice using divisibility rules for 2, 5, and 10.
- Recognize remainder patterns.



Introduce the **Remainder Table Completion**, **Remainder Chart**, **Remainder Two-Dice Switch**, and **Remainder Tic-Tac-Toe** activities by demonstrating on an overhead or interactive whiteboard.

Remainder activities are abstract and challenging. Attaching the term “has how many” to the \div sign creates a vivid image of the division process. $14 \div 3$ becomes “14 has how many (sets of) 3?” One strategy is to skip count by threes to 12 and determine how many more to 14 for the remainder. Another strategy would be to take 14 tokens and divide them into sets of 3 tokens, resulting in 4 sets of 3 with 2 left over.

The equation “ $3 \div 5 =$ ” can be confusing. Students might say that 3 divided by 5 is not possible. However, using tokens and inserting the term “has how many” into the equation will easily clarify the confusion: Display 3 tokens. Three has how many sets of 5? None. What’s left over? 3. So what is the solution? 0 remainder 3.

In some of the activities, it is possible for the die toss to result in a zero remainder. Discuss this possibility with the students before play begins.

Additional Suggestions

- A Hundred Chart (page *viii*) is a useful tool to aid students in finding the highest or lowest possible remainder. It is also a visual tool to aid students in generalizing how whole numbers work.
- If students are struggling to recall division facts, suggest they refer to the Division Chart (page *ix*), if necessary.

Getting Started – Questions to Ask:

- How can you tell which numbers will result in the highest possible remainder? A remainder of 1? A remainder of 0?
- When are prime numbers helpful, and when are they a disadvantage?
- What is a good strategy for figuring out remainders?
- How can a Hundred Chart help in figuring out remainders?
- Which is easier to find, the highest or the lowest possible remainder?
- What makes an activity fun? Challenging? Not fun?

Remainder Table Completion

How to Play

- Each team tosses a die. Higher number goes first.
- Taking turns, teams toss one or two dice. Depending on the activity, the value of the die or the sum of the two dice is the **divisor**.
- Team circles a multiple in the first column that, when divided by the toss, will result in the largest remainder.
- Team records the remainder in the third column.
- After ten tosses, the team tallies the remainders.
- The team with the greatest total wins.

Variation

- Team with the smallest remainder tally wins.

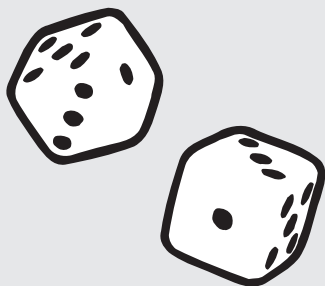
Remainder Table Completion: Write a Division Equation (Extra Challenge!)

How to Play

- Each team tosses a die. Higher number goes first. Teams share a chart.
- Taking turns, teams toss one or two dice. The value of the die or the sum of the two dice is the remainder.
- The team circles the remainder in the **Remainder Die Toss** column and generates a division equation for that remainder. (Example: $35 \div 6 = 5$ remainder 5)
- The team records the equation in the **Write an Equation** box.
- Teams may not repeat an equation that appears on either chart.
- If the remainder is not available, the team loses a turn.
- The first team to complete their table wins.

Variations

Each team or student is given a sheet of paper. With one person tossing a die or two dice to determine the remainder, teams or individual students race to see who can write the most division equations with that remainder in one minute. Or see who can be the first to write 5 equations or 10 equations.



Remainder Charts

With the **Remainder Chart** activities, students choose to play one of three games: **Four in a Row**, **Cross Over**, or **Square Off** (see game directions on page 37).

How to Play

- Each team tosses a die. Higher number goes first.
- Remainder Chart – Addition/Division**
 - Taking turns, the teams toss 2 dice, place the dice in Boxes 1 and 2 at the top of the chart, and find the sum.
 - Teams then toss a third die and place it in Box 3 to create a division equation.
 - The team divides the sum by the number on the third die and places a token on the remainder on the chart.
 - If the remainder is not available, the team loses a turn.
 - First team to complete their chart according to the rules of the game being played wins.

Remainder Charts – Multiplication/Division

- Taking turns, the teams toss 2 dice, place the dice in Boxes 1 and 2 at the top of the chart, and find the product.
- Teams then toss a third die and place it in Box 3 to create a division equation.
- The team divides the product by the number on the third die and places a token on the remainder on the chart.
- If the remainder is not available, the team loses a turn.
- First team to complete their chart according to the rules of the game being played wins.

Directions for Remainder Activities (cont.)

Remainder Two-Dice Switch

How to Play

See page 93.

Variations

- Team with the *smaller* remainder tally wins.
- After totaling the **Remainder** column, each team tosses a die and divides the total by the toss. The team with the largest remainder wins.

Remainder Tic-Tac-Toe

How to Play: Tic-Tac-Toe

- Each team tosses a die. Higher number goes first.
- Team 1 tosses 2 dice, places the dice in Boxes 1 and 2 at the top of the chart, and finds the sum (or product) of the 2 dice.
- Team 1 tosses a third die, places it in Box 3 at the top of the chart to create a dice equation, and divides the sum (or product) by the number on the third die.
- Team 1 places a token on the remainder produced by the division equation.
- Taking turns, the two teams continue playing until one team forms a **Tic-Tac-Toe** vertically, horizontally, or diagonally to win that game.
- Team winning 2 out of 3 games is the winner.

How to Play: Four-Grid Tic-Tac-Toe

- Taking turns, teams place a token on **one** remainder in any of the four Tic-Tac-Toe grids.
- When no more plays are possible, the teams count their Tic-Tac-Toe wins. Team with the most Tic-Tac-Toes wins.

Variations

- Teams place a token on every box in which the remainder appears.
- Teams replace opponent's token with their own.

Discussion

- What was your strategy in trying to win? Did you work on one quadrant at a time? Or did you look at all four quadrants simultaneously?
- Which strategy works best: trying to get the most three tokens in a row or trying to block your opponent?
- Discuss what would happen if both teams agreed to use the same strategy at the same time. Try this out!



Remainder Table Completion:

Multiple of 5 ÷ Die

- Each team tosses a die.
- Higher number goes first.



How to Play

- Toss a die. Which number in the first column of your chart will result in the **highest remainder**, when divided by the number tossed? Circle it.
- Next, record the number tossed in the box next to it (**÷ Toss** column).
- Then, record the remainder in the **Remainder** column.
- After you have filled the chart, total the remainders.
- Team with the largest remainder total wins.

Team: _____

Multiple of 5	÷ Toss	Remainder
10		
15		
20		
25		
30		
35		
40		
45		
50		
55		
Remainder Total =		

Team: _____

Multiple of 5	÷ Toss	Remainder
10		
15		
20		
25		
30		
35		
40		
45		
50		
55		
Remainder Total =		

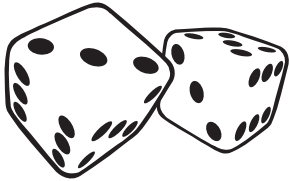
Remainder Table Completion:

Multiple of 5 ÷ Two-Dice Sum

- Each team tosses a die.
- Higher number goes first.

How to Play

- Toss two dice and find the sum. Which number in the first column of your chart, when divided by the sum, will result in the **highest remainder**? Circle it.
- Next, record the sum of the toss in the box next to it (\div **Toss** column).
- Then, record the remainder in the **Remainder** column.
- After you have filled the chart, total the remainders.
- Team with the largest remainder total wins.



Team: _____

Multiple of 5	\div Toss	Remainder
15		
20		
25		
30		
35		
40		
45		
50		
55		
60		
Remainder Total =		

Team: _____

Multiple of 5	\div Toss	Remainder
15		
20		
25		
30		
35		
40		
45		
50		
55		
60		
Remainder Total =		