

**Find the remainders**

$$\text{rem}(70 \times 33 \times 73, 8)$$

$$\equiv 6 \times 1 \times 1 \equiv 6$$

$$\text{rem}(65 \times 46 \times 24, 7)$$

$$\equiv 2 \times 4 \times 3 \equiv 3$$

$$\text{rem}(20 \times 92 \times 62, 3)$$

$$\equiv 2 \times 2 \times 2 \equiv 2$$

$$\text{rem}(91 \times 69 \times 89, 5)$$

$$\equiv 1 \times 4 \times 4 \equiv 1$$

$$\text{rem}(72 \times 45 \times 80, 7)$$

$$\equiv 2 \times 3 \times 3 \equiv 4$$

$$\text{rem}(29 \times 72 \times 76, 5)$$

$$\equiv (-1) \times 2 \times 1 \equiv 3$$

$$\text{rem}(96 \times 31 \times 96, 10)$$

$$\equiv 6 \times 1 \times 6 \equiv 6$$

$$\text{rem}(37 \times 40 \times 30, 11)$$

$$\equiv 4 \times 7 \times 8$$

$$\text{rem}(21 \times 28 \times 31, 5)$$

$$\equiv 1 \times 8 \times 1 \equiv 3$$

$$\text{rem}(41 \times 43 \times 30, 7)$$

$$\equiv (-1) \times 1 \times 2 \equiv 5$$

$$\begin{array}{ll} \text{rem}(60 \times 75 \times 96, 7) & \text{rem}(56 \times 34 \times 35, 9) \\ \equiv (-3) \times 5 \times 5 & \equiv 2 \times 7 \times 8 \\ \equiv (-3) \times 4 \equiv 2 & \equiv 4 \\ \text{rem}(25 \times 98 \times 89, 9) & \text{rem}(69 \times 94 \times 77, 5) \\ \equiv 7 \times 8 \times 8 \equiv 7 & \equiv (-1) \times 4 \times 2 \equiv 2 \\ \\ \text{rem}(18 \times 94 \times 93, 5) & \text{rem}(79 \times 97 \times 36, 7) \\ \equiv 3 \times 4 \times 3 \equiv 1 & \equiv 2 \times (-1) \times 1 \\ & \equiv 5 \\ \text{rem}(73 \times 94 \times 15, 11) & \text{rem}(42 \times 14 \times 31, 10) \\ \equiv (-4) \times (-5) \times 4 \equiv 80 \equiv 3 & \equiv 2 \times 4 \times 1 \equiv 8 \\ \\ \text{rem}(13 \times 72 \times 86, 12) & \text{rem}(82 \times 52 \times 73, 6) \\ \equiv 1 \times 0 \times 86 \equiv 0 & \equiv 4 \times 4 \times 1 \equiv 4 \end{array}$$

$$\text{rem}(24 \times 65 \times 90, 9)$$

$$\equiv 0$$

$$\text{rem}(61 \times 92 \times 59, 9)$$

$$\equiv 7 \times 2 \times 5 \equiv 7$$

$$\text{rem}(10 \times 92 \times 27, 11)$$

$$\equiv (-1) \times 4 \times 5 = 2$$

$$\text{rem}(77 \times 14 \times 56, 10)$$

$$\equiv 7 \times 4 \times 6 \equiv 8$$

$$\text{rem}(74 \times 18 \times 94, 8)$$

$$\equiv 0$$

$$\text{rem}(18 \times 52 \times 25, 10)$$

$$\equiv 0$$

$$\text{rem}(51 \times 44 \times 58, 10)$$

$$\equiv 1 \times 4 \times 8 \equiv 2$$

$$\text{rem}(90 \times 19 \times 52, 8)$$

$$\equiv 0$$

$$\text{rem}(49 \times 57 \times 77, 4)$$

$$\equiv 1 \times 1 \times 1 \equiv 1$$

$$\text{rem}(21 \times 17 \times 13, 8)$$

$$\equiv 5 \times 1 \times 5 \equiv 1$$

$$\begin{array}{ll} \text{rem}(44 \times 13 \times 32, 7) & \text{rem}(69 \times 73 \times 61, 5) \\ \equiv 2 \times (-1) \times (-3) \equiv 6 & \equiv (-1) \times 3 \times 1 \equiv 2 \\ \\ \text{rem}(77 \times 48 \times 94, 12) & \text{rem}(66 \times 17 \times 88, 10) \\ \equiv 0 & \equiv 6 \times 7 \times 8 \equiv 6 \\ \\ \text{rem}(67 \times 50 \times 96, 7) & \text{rem}(33 \times 39 \times 47, 10) \\ \equiv (-3) \times 1 \times (-2) \equiv 6 & \equiv 3 \times (-1) \times (-3) \equiv 9 \\ \\ \text{rem}(81 \times 28 \times 21, 8) & \text{rem}(58 \times 78 \times 61, 8) \\ \equiv 4 & \equiv 4 \\ \\ \text{rem}(56 \times 64 \times 29, 12) & \text{rem}(76 \times 25 \times 79, 3) \\ \equiv (-4) \times 4 \times 5 & \equiv 1 \times 1 \times 1 \equiv 1 \\ \\ \equiv 8 \times 8 \equiv 4 & \end{array}$$

$$\begin{array}{ll} \text{rem}(26 \times 61 \times 46, 6) & \text{rem}(64 \times 32 \times 29, 10) \\ \equiv 2 \times 1 \times 4 \equiv 2 & \equiv 4 \times 2 \times (-1) \equiv 2 \end{array}$$

$$\begin{array}{ll} \text{rem}(79 \times 96 \times 79, 6) & \text{rem}(71 \times 75 \times 17, 4) \\ \equiv 0 & \equiv (-1) \times (-1) \times 1 \equiv 1 \end{array}$$

$$\begin{array}{ll} \text{rem}(62 \times 25 \times 67, 6) & \text{rem}(25 \times 82 \times 21, 4) \\ \equiv 2 \times 1 \times 1 \equiv 2 & \equiv 2 \end{array}$$

$$\begin{array}{ll} \text{rem}(94 \times 83 \times 22, 10) & \text{rem}(26 \times 94 \times 31, 10) \\ \equiv 4 \times 3 \times 2 \equiv 4 & \equiv 6 \times 4 \times 1 \equiv 4 \end{array}$$

$$\begin{array}{ll} \text{rem}(79 \times 99 \times 40, 7) & \text{rem}(50 \times 11 \times 48, 9) \\ \equiv 2 \times 1 \times (-2) \equiv 3 & \equiv 5 \times 2 \times 3 \equiv 3 \end{array}$$

$$\text{rem}(27 \times 92 \times 80, 11)$$

$$\equiv 5 \times (-7) \times (-8) \equiv 5$$

$$\text{rem}(64 \times 62 \times 20, 12)$$

$$\equiv 4 \times 2 \times 8$$

$$\equiv 4$$

$$\text{rem}(54 \times 20 \times 38, 12)$$

$$\equiv 0$$

$$\text{rem}(86 \times 50 \times 82, 3)$$

$$\equiv 2 \times 2 \times 1 \equiv 1$$

$$\text{rem}(37 \times 46 \times 54, 10)$$

$$\equiv 7 \times 6 \times 4 \equiv 8$$

$$\text{rem}(57 \times 29 \times 57, 8)$$

$$\equiv 1 \times (-3) \times 1 \equiv 5$$

$$\text{rem}(71 \times 27 \times 95, 8)$$

$$\equiv (-1) \times 3 \times (-1) \equiv 3$$

$$\text{rem}(81 \times 21 \times 71, 11)$$

$$\equiv (-7) \times (-1) \times (-6)$$

$$\equiv 2$$

$$\text{rem}(42 \times 10 \times 60, 9)$$

$$\equiv 0$$

$$\text{rem}(61 \times 49 \times 93, 9)$$

$$\equiv 7 \times 4 \times 3$$

$$\equiv 3$$

$$\begin{array}{ll} \text{rem}(68 \times 31 \times 34, 11) & \text{rem}(54 \times 52 \times 61, 12) \\ \equiv 2 \times (-2) \times 1 \equiv 7 & \equiv 0 \end{array}$$

$$\begin{array}{ll} \text{rem}(51 \times 58 \times 94, 10) & \text{rem}(38 \times 66 \times 47, 10) \\ \equiv 1 \times 8 \times 4 \equiv 2 & \equiv 8 \times 6 \times 7 \equiv 6 \end{array}$$

$$\begin{array}{ll} \text{rem}(61 \times 28 \times 55, 12) & \text{rem}(33 \times 28 \times 96, 9) \\ \equiv 1 \times 4 \times 7 \equiv 4 & \equiv 0 \end{array}$$

$$\begin{array}{ll} \text{rem}(21 \times 69 \times 39, 10) & \text{rem}(19 \times 97 \times 66, 8) \\ \equiv 1 & \equiv 3 \times 1 \times 2 \equiv 6 \end{array}$$

$$\begin{array}{ll} \text{rem}(89 \times 85 \times 67, 3) & \text{rem}(90 \times 57 \times 29, 4) \\ \equiv 2 \times 13 \times 13 & \equiv 2 \\ \equiv 2 \times 4 \times 4 \equiv 2 & \end{array}$$

$$\text{rem}(85 \times 98 \times 36, 10)$$

$$\equiv 0$$

$$\text{rem}(99 \times 19 \times 88, 10)$$

$$\equiv 8$$

$$\text{rem}(17 \times 37 \times 40, 6)$$

$$\equiv (-1) \times 1 \times 4 \equiv 2$$

$$\text{rem}(44 \times 40 \times 24, 7)$$

$$\equiv 2 \times (-2) \times (-4)$$

$$\text{rem}(26 \times 41 \times 20, 9)$$

$$\equiv 8 \times 5 \times 2 \equiv 8$$

$$\text{rem}(64 \times 96 \times 24, 5)$$

$$\equiv 4 \times 6 \times 4 \equiv 6$$

$$\text{rem}(40 \times 23 \times 84, 9)$$

$$\equiv 4 \times 5 \times 3 \equiv 6$$

$$\text{rem}(87 \times 80 \times 63, 11)$$

$$\equiv (-1) \times (-8) \times (-3)$$

$$\text{rem}(19 \times 58 \times 87, 10)$$

$$\equiv (-1) \times (-2) \times (-3)$$

$$\text{rem}(14 \times 23 \times 49, 12)$$

$$\equiv 2 \times (-1) \times 1$$

$$\equiv 4$$

$$\equiv 10$$

$$\text{rem}(57 \times 98 \times 32, 11)$$

$$\equiv 2 \times (-1) \times (-1) \equiv 2$$

$$\text{rem}(83 \times 78 \times 52, 10)$$

$$\equiv 3 \times 8 \times 2$$

$$\equiv 8$$

$$\text{rem}(85 \times 17 \times 19, 4)$$

$$\equiv 1 \times 1 \times (-1) \equiv 3$$

$$\text{rem}(77 \times 71 \times 78, 8)$$

$$\equiv 5 \times (-1) \times (-2)$$

$$\equiv 2$$

$$\text{rem}(26 \times 52 \times 90, 11)$$

$$\equiv 4 \times (-3) \times (-9)$$

$$\text{rem}(55 \times 83 \times 18, 12)$$

$$\equiv 6$$

$$\equiv 4 \times 27 \equiv 4 \times 5 \equiv 9$$

$$\text{rem}(96 \times 66 \times 88, 7)$$

$$\equiv (-2) \times (-4) \times 4$$

$$\text{rem}(48 \times 28 \times 72, 10)$$

$$\equiv 8 \times 8 \times 2 \equiv 8$$

$$\equiv 4$$

$$\text{rem}(78 \times 22 \times 99, 10)$$

$$\equiv (-2) \times 2 \times (-1) \equiv 4$$

$$\text{rem}(80 \times 93 \times 91, 9)$$

$$\equiv 8 \times 3 \times 1 \equiv 6$$

$$\text{rem}(11 \times 29 \times 34, 6)$$

$$\text{rem}(92 \times 50 \times 62, 12)$$

$$\equiv (-1) \times (-1) \times (-2)$$

$$\equiv (-4) \times 2 \times 2$$

$$\equiv 4$$

$$\equiv -16 \equiv 8$$

$$\text{rem}(80 \times 50 \times 35, 11)$$

$$\text{rem}(89 \times 76 \times 41, 9)$$

$$\equiv (-8) \times (-5) \times 2$$

$$\equiv 8 \times 4 \times 5$$

$$\equiv 3$$

$$\equiv 5 \times 5 \equiv 7$$

$$\text{rem}(40 \times 34 \times 35, 6)$$

$$\text{rem}(25 \times 44 \times 19, 12)$$

$$\equiv (-2) \times (-2) \times (-1)$$

$$\equiv 1 \times (-4) \times 7$$

$$\equiv 2$$

$$\equiv -4 \equiv 8$$

$$\text{rem}(48 \times 64 \times 26, 5)$$

$$\text{rem}(84 \times 71 \times 31, 10)$$

$$\equiv 3 \times 4 \times 1 \equiv 2$$

$$\equiv 4$$

$$\text{rem}(51 \times 52 \times 37, 11)$$

$$\text{rem}(13 \times 46 \times 67, 11)$$

$$\equiv (-4) \times (-3) \times 4$$

$$\equiv 2 \times 2 \times 1 \equiv 4$$

$$\equiv 4$$

$$\begin{aligned} & \text{rem}(63^{60}, 12) & \text{rem}(74^{94}, 10) \\ &= [1]_4 &= [0]_2 \Rightarrow 6 \\ & \text{s} & \\ &= [0]_3 &= [1]_5 \end{aligned}$$

$$\begin{aligned} & \text{rem}(29^{25}, 3) & \text{rem}(23^{24}, 7) \\ & \equiv (-1)^{25} \equiv 2 & \equiv 1 \end{aligned}$$

$$\begin{aligned} & \text{rem}(76^{12}, 10) & \text{rem}(59^{48}, 6) \\ &= [0]_2 & \equiv (-1)^{48} \equiv 1 \\ &= [1]_5 \Rightarrow 6 & \\ & \text{rem}(48^{74}, 9) & \text{rem}(37^{98}, 12) \\ & \equiv 0 & \equiv 1 \end{aligned}$$

$$\begin{aligned} & \text{rem}(72^{48}, 12) & \text{rem}(11^{78}, 8) \\ & \equiv 0 & \equiv 3^{78} \equiv 9^{39} \equiv 1 \end{aligned}$$

$$\text{rem}(21^{72}, 6)$$

$$\equiv 3$$

$$\text{rem}(46^{61}, 12)$$

$$\begin{aligned} &= [0]_4 \\ &= [1]_3 \Rightarrow 4 \end{aligned}$$

$$\text{rem}(24^{83}, 9)$$

$$\equiv 0$$

$$\text{rem}(85^{39}, 6)$$

$$\equiv 1^{39} \equiv 1$$

$$\text{rem}(11^{81}, 6)$$

$$\equiv (-1)^{81} \equiv 5$$

$$\text{rem}(75^{38}, 4)$$

$$\equiv (-1)^{38} \equiv 1$$

$$\text{rem}(88^{99}, 9)$$

$$\equiv (-2)^{99} \equiv (-8)^{33} \equiv 1$$

$$\text{rem}(25^{62}, 11)$$

$$\equiv 3^2 \equiv 9$$

$$\text{rem}(66^{77}, 4)$$

$$\equiv 0$$

$$\text{rem}(98^{60}, 6)$$

$$\begin{aligned} &= [1]_3 \\ &= [0]_2 \Rightarrow 4 \end{aligned}$$

$$\text{rem}(37^{66}, 6)$$

$$\text{rem}(86^{11}, 11)$$

$$\equiv 1$$

$$\equiv -2 \equiv 9$$

$$\text{rem}(39^{23}, 11)$$

$$\text{rem}(64^{83}, 10)$$

$$\equiv 6^3 \equiv 3 \times 6 \equiv 7$$

$$\begin{aligned} &= [0]_2 \\ &= [4]_5 \Rightarrow 4 \end{aligned}$$

$$\text{rem}(81^{22}, 4)$$

$$\text{rem}(96^{83}, 10)$$

$$\equiv 1$$

$$\begin{aligned} &= [0]_2 \\ &= [1]_5 \Rightarrow 6 \end{aligned}$$

$$\text{rem}(69^{81}, 11)$$

$$\text{rem}(76^{89}, 10)$$

$$\equiv 3' \equiv 3$$

$$\equiv 6$$

$$\text{rem}(32^{87}, 8)$$

$$\text{rem}(95^{68}, 6)$$

$$\equiv 0$$

$$\equiv (-1)^{68} \equiv 1$$

$$\text{rem}(30^{91}, 6)$$

$$\text{rem}(18^{78}, 6)$$

$$\equiv 0$$

$$\equiv 0$$

$$\text{rem}(88^{53}, 4)$$

$$\text{rem}(92^{25}, 7)$$

$$\equiv 0$$

$$\equiv \lfloor^{25} \equiv \rfloor$$

$$\text{rem}(96^{18}, 9)$$

$$\text{rem}(99^{33}, 11)$$

$$\equiv 0$$

$$\equiv 0$$

$$\text{rem}(58^{11}, 4)$$

$$\text{rem}(35^{33}, 7)$$

$$\equiv 0$$

$$\equiv 0$$

$$\text{rem}(89^{44}, 10)$$

$$\text{rem}(99^{71}, 6)$$

$$\equiv (-1)^{44} \equiv 1$$

$$\equiv 3$$

$$\text{rem}(25^{38}, 9)$$

$$\text{rem}(70^{52}, 8)$$

$$\equiv \lceil^2 \equiv 4$$

$$\equiv 0$$

$$\text{rem}(71^{47}, 5)$$

$$\text{rem}(35^{55}, 8)$$

$$\equiv |$$

$$\equiv 3^3 \equiv 3$$

$$\text{rem}(42^{47}, 11)$$

$$\text{rem}(74^{81}, 10)$$

$$\equiv (-2)^7 \equiv -128$$

$$= [0]_2$$

$$\equiv -1 \equiv 4$$

$$\Rightarrow 4$$

$$\text{rem}(50^{84}, 6)$$

$$\text{rem}(49^{39}, 6)$$

$$= [0]_2$$

$$\equiv 1$$

$$= [1]_3 \Rightarrow 4$$

$$\text{rem}(99^{17}, 8)$$

$$\text{rem}(97^{98}, 9)$$

$$\equiv 3^1 \equiv 3$$

$$\equiv \lceil^2 \equiv 4$$

$$\begin{array}{rcl} \text{rem}(97^{35}, 11) & & \text{rem}(37^{61}, 9) \\ \equiv (-2)^{5} \equiv -32 \equiv | & & \equiv |^{61} \equiv | \end{array}$$

$$\begin{array}{rcl} \text{rem}(24^{39}, 5) & & \text{rem}(69^{41}, 11) \\ \equiv (-1)^{39} \equiv 4 & & \equiv 3 \end{array}$$

$$\begin{array}{rcl} \text{rem}(55^{19}, 8) & & \text{rem}(11^{31}, 8) \\ \equiv (-1)^{19} \equiv 7 & & \equiv 3^3 \equiv 3 \end{array}$$

$$\begin{array}{rcl} \text{rem}(74^{84}, 5) & & \text{rem}(32^{48}, 3) \\ \equiv (-1)^{84} \equiv 1 & & \equiv | \end{array}$$

$$\begin{array}{rcl} \text{rem}(56^{24}, 5) & & \text{rem}(94^{21}, 8) \\ \equiv | & & \equiv 0 \end{array}$$

$$\text{rem}(36^{13}, 9)$$

$$\text{rem}(70^{47}, 10)$$

$$\equiv 0$$

$$\equiv 0$$

$$\text{rem}(72^{77}, 5)$$

$$\text{rem}(33^{62}, 9)$$

$$\equiv 2^1 \equiv 2$$

$$\equiv 0$$

$$\text{rem}(39^{89}, 6)$$

$$\text{rem}(78^{56}, 9)$$

$$\equiv 3$$

$$\equiv 0$$

$$\text{rem}(27^{11}, 8)$$

$$\text{rem}(55^{16}, 10)$$

$$\equiv 3^3 \equiv 3$$

$$\equiv 5$$

$$\text{rem}(43^{20}, 12)$$

$$\text{rem}(98^{40}, 5)$$

$$\equiv |$$

$$\equiv |$$

$$\text{rem}(72^{92}, 12)$$

$$\text{rem}(82^{92}, 7)$$

$$\equiv 0$$

$$\equiv (-2)^2 \equiv 4$$

$$\text{rem}(96^{59}, 9)$$

$$\text{rem}(80^{55}, 7)$$

$$\equiv 0$$

$$\equiv 3^1 \equiv 3$$

$$\text{rem}(58^{99}, 8)$$

$$\text{rem}(80^{98}, 8)$$

$$\equiv 0$$

$$\equiv 0$$

$$\text{rem}(57^{94}, 12)$$

$$\text{rem}(73^{53}, 12)$$

$$\begin{aligned} &= [0]_3 \\ &= [1]_4 \Rightarrow 9 \end{aligned}$$

$$\equiv 1$$

$$\text{rem}(26^{30}, 9)$$

$$\text{rem}(84^{90}, 6)$$

$$\equiv (-1)^{30} \equiv 1$$

$$\equiv 0$$

$$\text{rem}(32^{63}, 12)$$

$$\text{rem}(45^{19}, 5)$$

$$\begin{aligned} &= [o]_4 \Rightarrow 8 \\ &= [z]_3 \end{aligned}$$

$$\equiv 0$$

$$\text{rem}(62^{17}, 10)$$

$$\begin{aligned} &= [o]_2 \\ &= [z]_5 \Rightarrow 2 \end{aligned}$$

$$\text{rem}(32^{74}, 12)$$

$$\begin{aligned} &= [0]_4 \Rightarrow 4 \\ &= [1]_3 \end{aligned}$$

$$\text{rem}(95^{36}, 7)$$

$$\text{rem}(25^{81}, 9)$$

$$\equiv |$$

$$\equiv \lceil^3 \equiv |$$

$$\text{rem}(93^{51}, 5)$$

$$\text{rem}(49^{31}, 10)$$

$$\equiv 3^3 \equiv 2$$

$$\equiv (-1)^{31} \equiv 9$$

$$\text{rem}(35^{88}, 6)$$

$$\text{rem}(66^{93}, 11)$$

$$\equiv (-1)^{88} \equiv 1$$

$$\equiv 0$$

$$\text{rem}(33^{29}, 4)$$

$$\text{rem}(71^{40}, 12)$$

$$\equiv |$$

$$\equiv |$$

$$\text{rem}(14^{55}, 6)$$

$$\text{rem}(54^{71}, 11)$$

$$\begin{aligned} &= [0]_2 \\ &= [2]_3 \Rightarrow 2 \end{aligned}$$

$$\equiv (-1)^{71} \equiv 1$$

$$\text{rem}(78^{61}, 10)$$

$$\text{rem}(32^{45}, 5)$$

$$\begin{aligned} &= [0]_2 \\ &= [3]_5 \Rightarrow 8 \end{aligned}$$

$$\equiv 2^1 \equiv 2$$

$$\text{rem}(62^{41}, 7)$$

$$\text{rem}(35^{20}, 9)$$

$$\equiv (-1)^{41} \equiv 6$$

$$\equiv (-1)^{20} \equiv 1$$

$$\text{rem}(52^{17}, 4)$$

$$\text{rem}(26^{30}, 7)$$

$$\equiv 0$$

$$\equiv |$$