Multiplication and Division 1

Stage 3 Outcome

A student:

› describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM

› selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations MA3-2WM

› gives a valid reason for supporting one possible solution over another MA3-3WM

› selects and applies appropriate strategies for multiplication and division, and applies the order of operations to calculations involving more than one operation MA3-6NA

Language: Students should be able to communicate using the following language: multiply, multiplied by, product, multiplication, multiplication facts, **area**, **thousands**, **hundreds**, tens, ones, double, multiple, factor, divide, divided by, **quotient**, division, halve, remainder, **fraction**, **decimal**, equals, strategy, digit, **estimate**, **round to**.

Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date/ LAC Icons
Ignition Activities **In Pairs** The teacher gives each group of students a pack of number cards (0 – 9). They shuffle the cards and place them in a pack face down in the centre of the group of players. One player who is the 'dealer' turns over the top three cards. Players can use each digit up to four times to create a number that is a multiple of 2, 3, 4, 5, 6, 7, 8, 9. The aim of the game is to make two digit numbers that are multiples of 2, 3, 4, 5, 6, 7, 8, 9. eg CARDS 6 8 9 88 is a multiple of 2 96 is a multiple of 3 68 is a multiple of 4 … is a multiple of 5 96 is a multiple of 6 … is a multiple of 7 … is a multiple of 8 … is a multiple of 9. A point is scored for each correct example. All answers are to be checked on the calculator by the 'dealer'. Each player has a turn at being the 'dealer' and then scores are tallied. The winner is the player who creates the largest number of correct examples. *Variation:* Students may use each digit up to five times or play with four cards each time.		

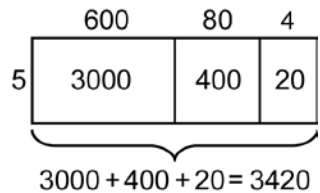|		
Mixed Operations Game In pairs, students are given a set of different-coloured counters each, three dice and a game board. Students create the game board by using any 25 numbers from 1 to 50. In turns, students roll the three dice, use these numbers with any operations to create a number from the board, and cover the number with a counter .The game continues until one player has three counters in a row in any direction. *Variation:* Students use four dice and make game boards with higher/lower numbers. The game could also be played with cards. | 20	11	38	47	16 | |----|----|----|----|----| | 19 | 17 | 8 | 15 | 12 | | 1 | 20 | 3 | 7 | 35 | | 26 | 42 | 34 | 43 | 49 | | 21 | 17 | 16 | 29 | 50 |		
Multo ▪ Provide each student with a 4X4 grid ▪ Students write products from 1X1 up to 10X10 in each square ▪ Roll ten sided dice twice, multiply numbers together ▪ Students cross off the answer on grids ▪ First with four in a row win – any direction		
Multiplication Grid Race Students race to finish a 10X10 grid of multiplication		
Salute! This game is played with a pack of cards. One player is the "dealer" who deals a single card to each player. When the dealer deals the cards he/she says "Salute" and the two other players hold the card up to their forehead so that the dealer and the other player can see the card. The dealer multiplies the cards mentally and announces the total. The first player to calculate the number on their own card wins both cards. The winner is the one with the most cards by the end of the deck. The dealer plays the winner and the game continues.(Value of the Ace is one and Value of Jack, Queen, King cards can be ten)		
Follow Me Game –Mixed Tables Deal out one card for each child. First child starts off with "I have 10. Who has 6x7? Children all look at the top of their card and the child with the correct answer says it out loud 'I am 42' and asks the next question which is on the bottom of their card 'Who has 3x4?' Game continues until all cards have been answered.		

Explicit Mathematical Teaching - Multiplication Revise multiplying two digit by one digit numbers 32 x 6= 30x6 + 2 x6 = Look at estimating skills eg 89 x 32 ≈ 90 x 30 =2700 Explain that when we estimate we are getting 'a feel' for the size of the answer not necessarily the correct answer. Present students with a range of multiplication and division questions and ask them to find the closest estimate from a list of possibles. 103 x 78 2 3998 x 21 7 800 97 x 302 80 000 13.99 ÷ 7.02 64 7.98 x 8.04 30 000 Express numbers as a product of two other numbers plus some remainder in different ways eg: 32 = 16 x 2 or 32 = 10 x 3 + 2 or 32 = 5 x 6 + 2 or 32 = 9 x 3 + 5 etc This leads in to looking at remainders when a number is divided by a non Revise multiplying two digit by one digit numbers 32 x 6= 30x6 + 2 x6 = Look at estimating skills eg 89 x 32 ≈ 90 x 30 =2700 Explain that when we estimate we are getting 'a feel' for the size of the answer not necessarily the correct answer. Present students with a range of multiplication and division questions and ask them to find the closest estimate from a list of possibles.		Critical and creative thinking
Explicit Mathematical Teaching – Division Demonstrate division with no remainders. 42 ÷ 7 = 6 Not all numbers are so nice! What happens when we divide a number by a non factor? We form as many groups containing that number as possible and the rest is called the remainder. Eg 13 ÷ 4 The remainder Can't always use this method - we would go dotty! We find another method of dividing. Repeated subtraction is presented (discuss the time factor). Present the formal method of division for single digit divisors.		Critical and creative thinking

<u>Explicit Mathematical Teaching – Multiplication</u>

Multiplying three- and four-digit numbers by one-digit numbers using area model, mental or written strategies

Area model

600	80	4
5	3000	400	20

$3000 + 400 + 20 = 3420$

(mental)   (written)

eg 432×5 $= 400 \times 5 + 30 \times 5 + 2 \times 5$ 432
          $= 2000 + 150 + 10$ $\times$ 5
          $= 2160$ 2160

- multiplying three-digit numbers by two-digit numbers
using the extended form (long multiplication)

600	80	4
5	3000	400	20

$3000 + 400 + 20 = 3420$

and
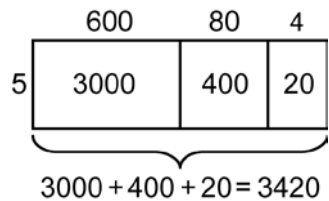
eg   521
                 $\times$ 22
                 1042
                 10420
                 11462

Demonstrate the formal method for multiplication. **EXPLAIN** that the multiplication of a digit in the tens place value is multiplying by a multiple of ten and that is why we put the 0 place holder in the algorithm.

Explicit Mathematical teaching – Division

Dividing a number with three or more digits by a single divisor using mental or written strategies

$$\begin{array}{lll}
 & \text{(mental)} & \text{(written)} \\
\text{eg } 341 \div 4 & 340 \div 4 = 85 & 85\tfrac{1}{4} \\
 & 1 \div 4 = \tfrac{1}{4} & 4\overline{)341} \\
 & 341 \div 4 = 85\tfrac{1}{4} &
\end{array}$$

recognising and using different notations to indicate division eg $25 \div 4$, $4\overline{)25}$, $\tfrac{25}{4}$

Expliciti Teaching - Written Division

Students solve problems that involve dividing a three-digit number by a one-digit number using written strategies, showing remainders as a fraction:

$$85\tfrac{1}{4}$$
$$4\overline{)34^21}$$

Students solve division problems interpreting when remainders need to be rounded up eg finding the number of cars with four seats to take 341 people to an event, the solution would be 86 not 85¼ .
Variation: Students use calculators to check answers and discuss.

Demonstrate that the inverse operation is multiplication by obtaining the original number eg. $204 \div 6 = 34$ -> $34 \times 6 = 204$ (show using the formal methods that this is true)

Show how division with remainders becomes a multiplication with an addend.
Eg. $19 \div 3 = 6\ r\ 1$ means $19 = 6 \times 3 + 1$. Express remainders as fractions.
 $19 \div 3 = 6\ 1/3$

Provide examples of both simple multiplications and divisions expressing remainders as fractions.

Literacy
Critical and creative thinking

Multiply numbers by powers of 10. Describe what happens to the number. This will be important when students begin to multiply by two digits. $\square$ x $\square$ x $\square$ = 100 How many solutions can you find? Make up some other tasks for your partner to solve. Explain how you would multiply 12 x 14 in your head.		Literacy Critical and creative thinking
Whole Class Teaching Activities **Extended Form of Multiplication** Students multiply numbers by breaking the calculation into two parts eg 32 × 14 = 32 × 10 + 32 × 4. Students are shown how these can be combined in using an extended algorithm. $$\begin{array}{r} 3\,2 \\ \times\ \ 1\,4 \\ \hline 1\,2\,8 \\ +\,3\,2\,0 \\ \hline 4\,4\,8 \end{array}$$ *Extension:* Students solve three-digit problems by two-digit multiplication using extended multiplication. *Present students with a range of word problems (see BST and SNAP questions). Help students to draw diagrams, act out and write algorithm from word problems. Students are then given number sentences to write as word problems.*		Literacy Critical and creative thinking
Rounding up division The teacher poses the scenario: 'A farmer has 49 eggs. He needs to put them into cartons, that each hold a dozen eggs, to send to market. How many cartons does he need?'		Literacy

Possible questions include: ▌ how many eggs will fit into each carton? ▌ what strategy did you use to find the solution? ▌ can you think of another way that the farmer could pack the eggs? Students record the strategies used including inverse operations as a checking answers. Students write their own problems involving division with remainders. They publish their work using a computer software package eg Powerpoint, Kidspix, Slideshow. *Variation:* The teacher poses the scenario involving larger numbers of eggs and different-sized cartons.		Critical and creative thinking
Product Estimations Students pose questions and estimate the answers. Possible questions include: ▌ what are 2 two-digit numbers that would have a product between 2000 and 2400? ▌ will 85 × 95 be between 7600 and 8000? (Students estimate first and then check.) ▌ estimate the answer for 39 × 61. Students then use a calculator to check their estimations. Students are encouraged to practise estimating, rounding and checking using other examples.		Literacy Critical and creative thinking
Guided Group/Independent Activities **Multiplication/Division Webs** Students create web patterns using three- or four-digit numbers. They draw the web with multiplication facts on one side and division facts on the back. Students swap their webs with a partner and write the answers in the outer web. They check the answers with a calculator. *Variation:* Students create multiplication or division webs using large numbers. 		

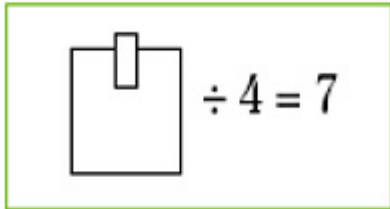|		
Spin, Estimate and Check Students make two octagonal spinners, one with three-digit numbers within a given range (eg 850 to 950) and the other with the numbers 2 to 9. Student A spins the two spinners and estimates the answer when the three-digit number is divided by the single-digit number. eg 920 ÷ 7 is about 130. Student B checks the answer on a calculator. Student A scores 1 point if their estimate is 21 or more away from the answer, 2 points if their estimate is 11 to 20 away from the answer and 3 points if their estimate is 10 or less away from the answer. Students swap roles. Students take turns and keep a tally of their scores. The game continues until one student scores 20 or more points. *Variation:* Students could repeat the activity for multiplication.		
Remainders Count Students have 3 numeral dice and paper to record on. In turns, students roll the dice and using the three numbers make a division number sentence, eg. if a 6, 4 & 5 were rolled then a student could make 46÷5. The student determines the answer and keeps a tally of any remainders. In this case it would be one. However if the student makes 45 ÷ 6, the remainder would be 3. The remainders become the student's score. The winner is the first to reach a score of 20		
Completing Number Sentences $\boxed{} \div 4 = 7$ What number, when divided by four will give you 7?		
Previous NAPLAN Question 2008-Question 11 11 $5427 \div 9 =$? 63 603 630 6003		

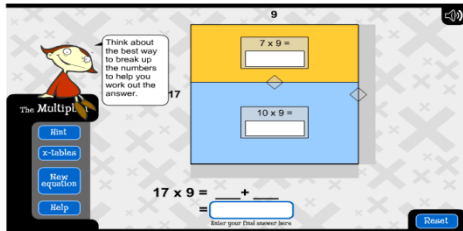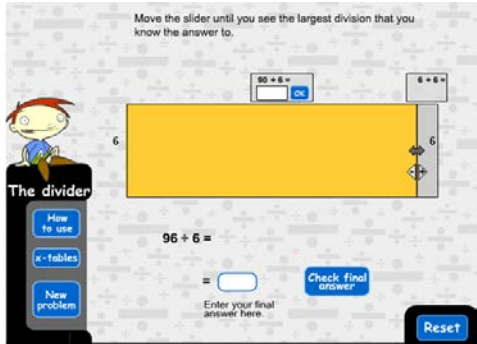|		
<u>Computer Learning Object</u> **Remainders Count** Count Me In Too learning object - Game 11 Click **here** to access the teacher support material pdf - 76kb		Information and communication technology capability
<u>Computer Learning Objects</u> **The Multiplier: Generate Easy Multiplications** **TaLe Reference Number: L83** Solve multiplications such as 9x88. Use a partitioning tool to help solve randomly generated multiplications. Learn strategies to do complex arithmetic in your head. Split a multiplication into parts that are easy to work with, use simple times tables, then solve the original calculation. This learning object is one in a series of five objects. **http://tlf.dlr.det.nsw.edu.au/learningobjects/Content/L83/object/index.html** 		Information and communication technology capability
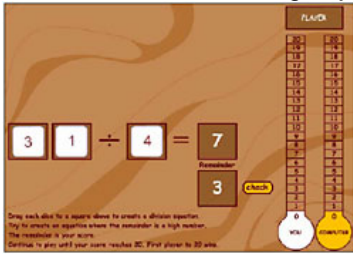
The Divider :without remainders-Years 4-6 **TaLe reference number: L2007** **http://tlf.dlr.det.nsw.edu.au/learningobjects/Content/L2007/object/index.html** 		
The Divider :Whole Number Remainders-Years 4-6 **TaLe Reference Number : L2008** **http://tlf.dlr.det.nsw.edu.au/learningobjects/Content/L2008/object/index.html** 		
Arrays-Solving Word problems **TaLe Reference Number:L2055** **http://tlf.dlr.det.nsw.edu.au/learningobjects/Content/L2055/object/index.html** 		
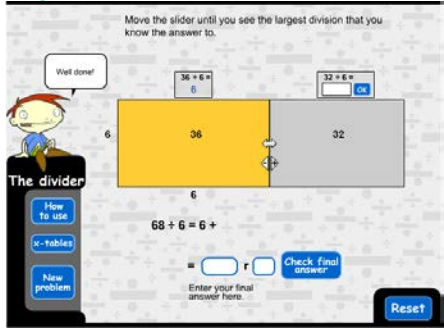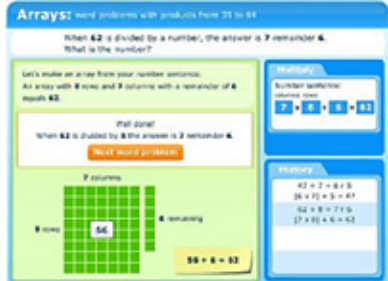
Multiplication Grids
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg6/multigrids1.swf
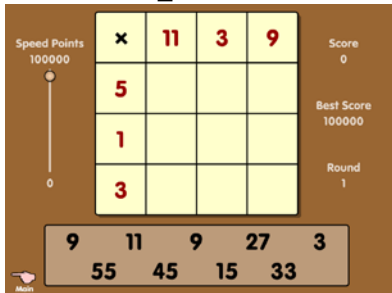
complete three multiplication grids by dragging the numbers to the correct position on the grid. The faster you work, the more points you will earn!
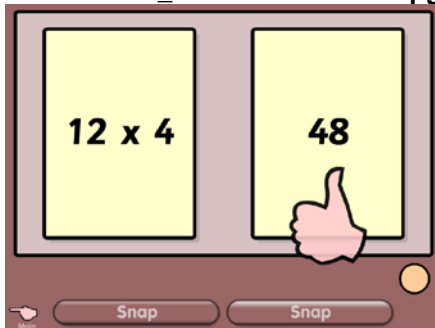
Sum Sense
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg2/summulti.html
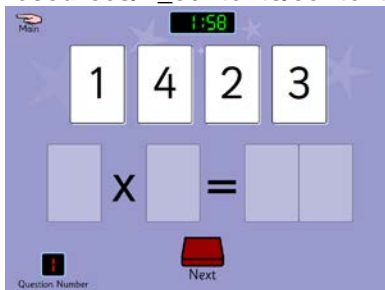
Drag and drop the number cards to make 'sum' sense. When you think the cards are in the correct place, press the 'Next' button for another question.

Times-Table Snap!
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg5/snaptab.html

Speed Grid Challenge
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg2/urikamultires.html
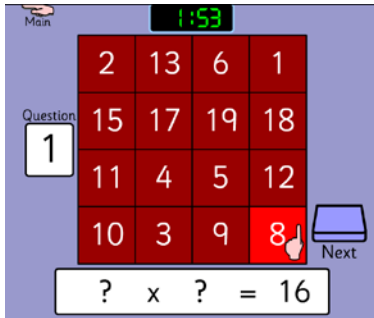
Speed Grid Challenge is a one player game against the clock. Select the number of questions and the time you will allow and then press START. You now must answer the question set at the bottom of the screen by clicking on two of the numbers in the grid. Once you think your answer is correct click on NEXT to move onto the next question.

Dice Connect
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg3/dicemulti.html
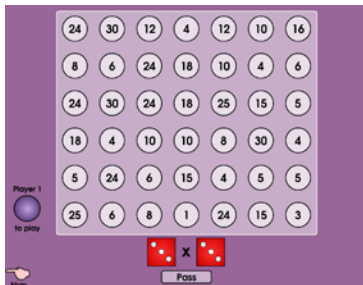

Dice Connect is a two player game. The object of the game is to get four counters in either a vertical, horizontal, or diagonal line. To cover a number multiply the dice together and then click on the total in the grid. If there is no number left to click the player must pass.

Arithmagons (Multiplication)
**http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg5/arithmul.html**
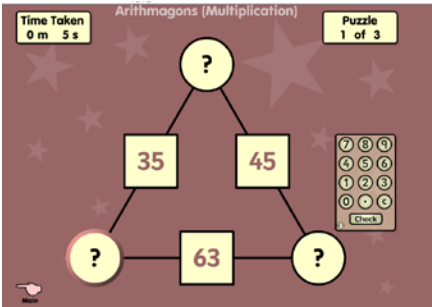
in Arithmagons (Multiplication) the value of each square is the product of the adjacent circles. Determine the value of each circle to compete the puzzle. Click in each circle and use the on-screen keypad to enter your value. Press the 'Check' button when you think you have completed the puzzle.

Eggs on Legs (Multiplication)
http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/pg/pg5/eggsmult.html
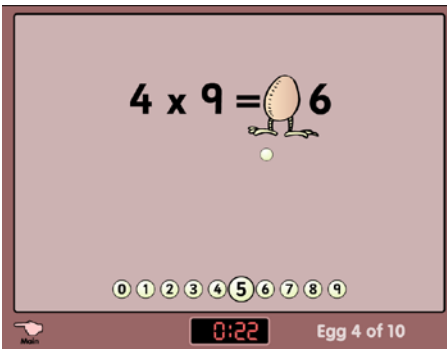
Choose which multiplication facts you wish to attempt and also the number of eggs you want to crack. To crack an egg, click on the numbered ball which you think corresponds to the digit hidden behind it. An incorrect throw will result in a time penalty.

Two-Player Table Mountain Challenge (Multiplication) **http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/ts/tables/tmchall2.html** 		Information and communication technology capability
Time Tables **http://www.eastiron.org/schools/interactive-resources/ir_contents/contents/ts/tables/tgame1.html** Can you answer 20 questions within a minute?		Information and communication technology capability