1 a) $(26+83)+54 = (26+54)+83 = 80+83 = 163$

b) $(4 \times 34) \times 25 = (4 \times 25) \times 34 = 100 \times 34 = 3400$

c) $256 \times 6 = (200+50+6) \times 6 = (200 \times 6) + (50 \times 6) + (6 \times 6)$
$= 1200 + 300 + 36 = 1536$

d) $288 \div 24 = (240+48) \div 24 = 10 + 2 = 12$

e) $44 \times 56 + 56^2 = (44+56) \times 56 = 100 \times 56 = 5600$

f) $402 \times 12 = 402 \times (10+2) = (402 \times 10) + (402 \times 2)$
$= 4020 + 804 = 4824$

2 a) $123 + 326 + 4 + 77 = 200 + 330 = 530$

b) $2 \times 6 \times 7 \times 5 = 10 \times 42 = 420$

c) $3200 \times 34 \div 16 = \frac{3200}{16} \times 34 = 200 \times 34 = 6800$

3 a) $197 \overset{\leftarrow 3}{+} 568 = 200 + 565 = 765$ (can be viewed as $197+3+568-3$)

b) $62 - 39 = 63 - 40 = 23$
(add 1 to both)

c) $48 \times 25 = 12 \times (4 \times 25) = 12 \times 100 = 1200$

d) $500 \div 25 = 100 \div 5 = 20$
(divide both by 5)
(alternatively, each 100 is four 25's
So $500 \div 25 = 5 \times 4 = 20$)

e) $71 - 42 = 69 - 40 = 29$
(subtract 2 from both)

f) $180 \div 15 = 360 \div 30 = 120 \div 10 = 12$
(double both; divide both by 3)

5 a) $78 \times 9 = 78 \times (10-1) = 780 - 78 = 702$

b) $37 \times 4 = 74 \times 2 = 148$

c) $136 \div 8 = 68 \div 4 = 34 \div 2 = 17$
(to divide by 8, you can halve three times; you can think $136 \to 68 \to 34 \to (17)$)

d) $1500 \div 25 = 6000 \div 100 = 60$ (multiply both by 4)

(alternatively $1500 \div 25 = 300 \div 5 = 60$, divide both by 5)

e) $1575 \div 25 = (1500 + 75) \div 25 = 60 + 3 = 63$ (60 from part d)

f) $325 \div 5 = 650 \div 10 = 65$ (double both)

6 Classify as either PV (Mental Math developing Place Value)
DP (Mental Math developing the Distributive Prop)
X (Not appropriate for Mental Math)

a) PV $37 + 99 = 36 + 100 = 136$ (1 carried)

b) PV $20 \times 40 = 800$

c) DP $7 \times 102 = 7 \times (100 + 2) = 700 + 14 = 714$

d) X 13×28

e) PV $326 - 98 = 328 - 100 = 228$ (add 2 to both)

f) X $337 + 879$

g) DP $119 \div 7 = (70 + 49) \div 7 = 10 + 7 = 17$

h) DP $3 \times 32 = 3 \times (30 + 2) = 90 + 6 = 96$