



Examples of Strategies

Mental Math

Grade 11 Essential Mathematics (30S)

S-1

Sample Strategies

Begin adding from the left

When you do addition questions using paper and pencil, you usually start from the right and work toward the left.



To do addition in your head, start from the left.

EXAMPLE 1

$$\begin{array}{r} 46 \\ + 38 \\ \hline \end{array}$$

$$40 + 30 = 70$$

$$6 + 8 = 14$$

$$70 + 14 = 84$$

EXAMPLE 2

$$\begin{array}{r} 25.6 \\ + 13.7 \\ \hline \end{array}$$

$$20 + 10 = 30$$

$$5 + 3 = 8$$

$$\frac{6}{10} + \frac{7}{10} = 1 \text{ and } \frac{3}{10}$$

$$30 + 8 + 1\frac{3}{10} = 39.3$$

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S-2

Sample Strategies

Break down numbers and add their parts

Here's another way of doing addition in your head.

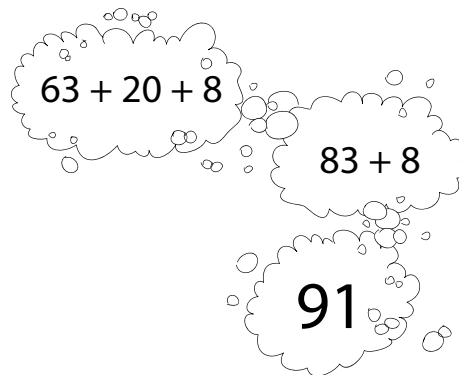
$$\begin{array}{r} 63 \\ + 28 \\ \hline \end{array}$$



Break down the numbers, then add their parts.

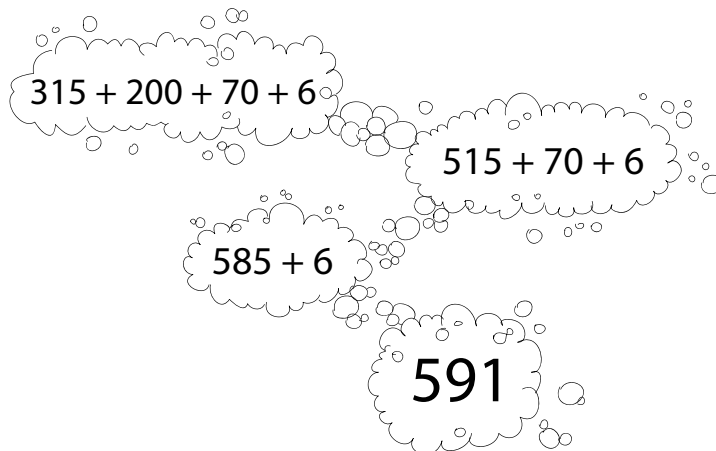
EXAMPLE 1

$$\begin{array}{r} 63 \\ + 28 \\ \hline \end{array}$$



EXAMPLE 2

$$\begin{array}{r} 315 \\ + 276 \\ \hline \end{array}$$



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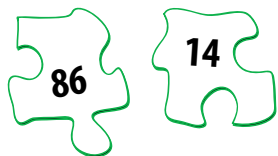
S-3

Sample Strategies

Finding compatible numbers

Compatible numbers are pairs of numbers that are easy to add in your head.

The following are examples of compatible numbers:



The sum equals 100

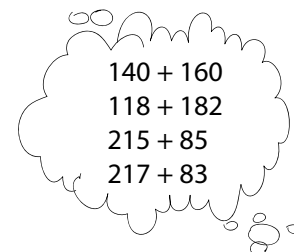


The sum equals 600



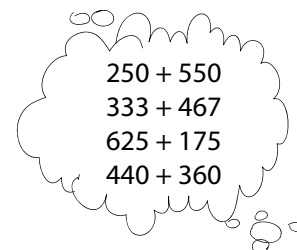
Find the pairs of compatible numbers that add up to 300.

140	85	160
118	217	73
215	182	83



Find the pairs of compatible numbers that add up to 800.

250	175	567
333	440	467
625	550	360



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Sample Strategies

Create your own compatible numbers



Sometimes it is easier to do addition in your head by creating your own compatible numbers and adjusting the total.

EXAMPLE
1

$$\begin{array}{r} 650 \\ + 375 \\ \hline \end{array}$$

$$650 + 350 + 25$$

$$1000 + 25$$

$$1025$$

EXAMPLE
2

$$\begin{array}{r} 1250 \\ + 753 \\ \hline \end{array}$$

$$1250 + 750 + 3$$

$$2000 + 3$$

$$2003$$

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Sample Strategies

Subtract starting from the left

Here's a technique that works well when doing subtraction questions that do not require grouping.



To do subtraction in your head, start from the left and think of your answer one part at a time.

EXAMPLE 1

$$\begin{array}{r} 468 \\ - 323 \\ \hline \end{array}$$

$$400 - 300 = 100$$

$$60 - 20 = 40$$

$$8 - 3 = 5$$

$$100 + 40 + 5 = 145$$

EXAMPLE 2

$$\begin{array}{r} 9514 \\ - 6203 \\ \hline \end{array}$$

$$9000 - 6000 = 3000$$

$$500 - 200 = 300$$

$$14 - 3 = 11$$

$$3000 + 300 + 11 = 3311$$

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Sample Strategies

Subtract one part at a time



When you do a subtraction question that requires a grouping, subtract one part at a time.

EXAMPLE
1

$$\begin{array}{r} 132 \\ - 59 \\ \hline \end{array}$$

$$132 - 50 = 82$$

$$82 - 9 = 73$$

Check your answer by adding the following in your head:

$$73 + 59 = 120 + 12 = 132$$

EXAMPLE
2

$$\begin{array}{r} 6.25 \\ - 3.15 \\ \hline \end{array}$$

$$6.25 - 3 = 3.25$$

$$3.25 - 0.15 = 3.10$$



Don't forget to check your answer doing a mental addition.

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Sample Strategies

Balance subtraction with whole numbers

When you add the same number to the two elements of a subtraction question, the difference between the two does not change.



By adding to both elements, you balance the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE
1

$$\begin{array}{r} 76 \\ - 28 \\ \hline \end{array}$$

$$76 + 2 = 78$$

$$28 + 2 = 30$$

$$78 - 30 = 48$$

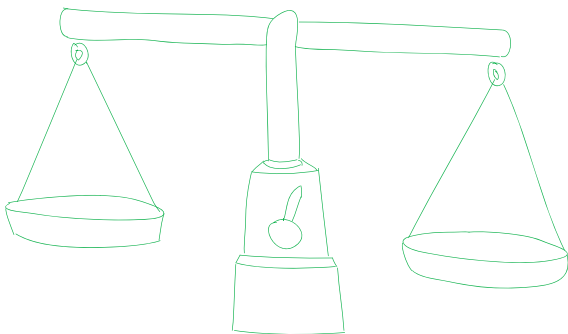
EXAMPLE
2

$$\begin{array}{r} 660 \\ - 185 \\ \hline \end{array}$$

$$660 + 15 = 675$$

$$185 + 15 = 200$$

$$675 - 200 = 475$$



Mental Math

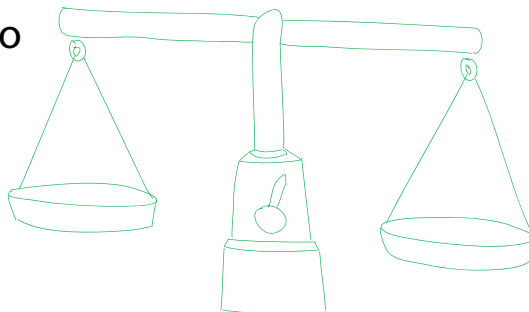
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Sample Strategies

Balance subtraction with decimal numbers

When you add the same number to the two elements of a subtraction question, the difference between the two does not change.



Adding to both elements balances the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE 1

$$\begin{array}{r} 4.32 \\ - 1.95 \\ \hline \end{array}$$

$$4.32 + 0.05 = 4.37$$

$$1.95 + 0.05 = 2$$

$$4.37 - 2 = 2.37$$

EXAMPLE 2

$$\begin{array}{r} 23.62 \\ - 15.89 \\ \hline \end{array}$$

$$23.62 + 0.11 = 23.73$$

$$15.89 + 0.11 = 16$$

$$23.73 - 16 = 7.73$$



Remember that you have to make sure the second element (not the first) becomes a number that is easy to subtract.

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S-9

Sample Strategies

Multiply starting from the left



It is easier to multiply in your head when you break down a number and multiply starting from the left.

Add in your head as you multiply each part.

EXAMPLE
1

$$\begin{array}{r} 635 \\ \times 4 \\ \hline \end{array}$$

$$600 \times 4 = 2400$$

$$30 \times 4 = 120$$

$$5 \times 4 = 20$$

$$2400 + 120 + 20 =$$

$$2540$$

EXAMPLE
2

$$\begin{array}{r} 528 \\ \times 3 \\ \hline \end{array}$$

$$500 \times 3 = 1500$$

$$20 \times 3 = 60$$

$$8 \times 3 = 24$$

$$1500 + 60 + 24 = 1584$$

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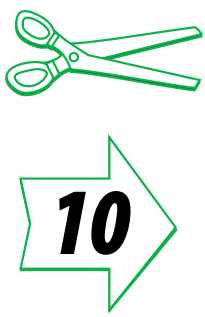
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S-10

Sample Strategies

Cut and paste the zeros

In multiplication, when one factor is multiplied by 10, the result is also multiplied by 10.


$$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array} \quad \begin{array}{r} 60 \\ \times 4 \\ \hline 240 \end{array}$$

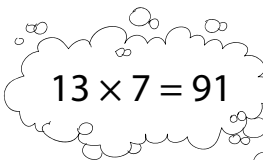
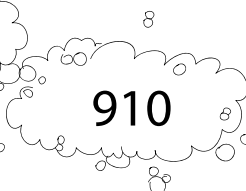
Knowing this concept, you can easily multiply by 10 in your head by following these steps:



1. Cut all the zeros at the end.
2. Multiply the remaining numbers.
3. Paste all the zeros back.

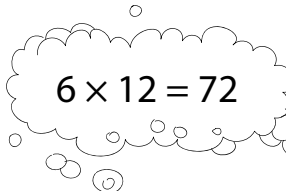

EXAMPLE
1

$$\begin{array}{r} 13 \\ \times 70 \\ \hline \end{array}$$


$$13 \times 7 = 91$$

$$910$$

EXAMPLE
2

$$\begin{array}{r} 6000 \\ \times 1200 \\ \hline \end{array}$$


$$6 \times 12 = 72$$

$$7,200,000$$

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S-11

Sample Strategies

Cut and paste the zeros

To mentally divide numbers that end in zero, follow these steps:



1. Cut all the zeros at the end.
2. Do the division.
3. Paste the zeros back.



EXAMPLE
1

$$\begin{array}{r} 2400 \\ \div 6 \\ \hline \end{array}$$

24 ÷ 6 = 4

400

Check the answer by multiplying: $6 \times 400 = 2400$

EXAMPLE
2

$$\begin{array}{r} 45,000 \\ \div 15 \\ \hline \end{array}$$

45 ÷ 15 = 3

3000

Check: $15 \times 3000 = 45,000$

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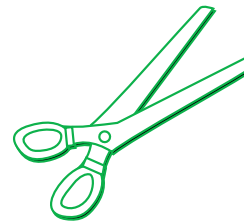
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S-12

Sample Strategies

Cut the zeros in dividend and divisor

When dividing the dividend and divisor by the same amount, the quotient does not change.



$$\begin{array}{r} 800 \\ \div 20 \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} 80 \\ \div 2 \\ \hline \end{array} \quad \rightarrow \quad 40$$

Knowing this concept will help you do division in your head more easily when the dividend and the divisor both end in zero.



All you have to do is divide both the dividend and divisor by the same value, 10.

EXAMPLE
1

$$\begin{array}{r} 6300 \\ \div 90 \\ \hline \end{array}$$

$630 \div 9$

70

EXAMPLE
2

$$\begin{array}{r} 4,500,000 \\ \div 500 \\ \hline \end{array}$$

$45,000 \div 5$

9000

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S-13

Sample Strategies

Work with prices

The sale price of items is often a little less than an even number of dollars.



To work with prices in your head, round off to the nearest dollar. Then, do the calculation required by the problem and adjust your answer.

EXAMPLE
1

$$\begin{array}{r} \$16.65 \\ + \$2.99 \\ \hline \end{array}$$

$$\begin{array}{l} \$16.65 + \$3 \\ = \$19.65 \end{array}$$

$$\$19.65 - 1\text{¢} =$$

$$\$19.64$$

EXAMPLE
2

$$\begin{array}{r} \$19.98 \\ \times \quad 6 \\ \hline \end{array}$$

$$6 \times \$20 = \$120$$

$$6 \times 2\text{¢} = 12\text{¢}$$

$$\$120 - 12\text{¢} =$$

$$\$119.88$$

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S-14

Sample Strategies

Check your change

When you buy something, it is important to check that the amount of change returned to you is correct.

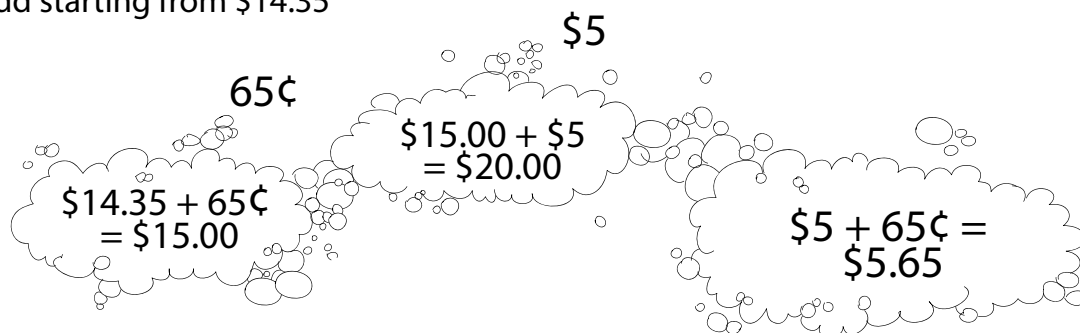


There is an easier way than subtracting in your head:
add to the purchase price.

EXAMPLE 1

You buy a CD for \$14.35 with a \$20 bill. How much change should you get back?

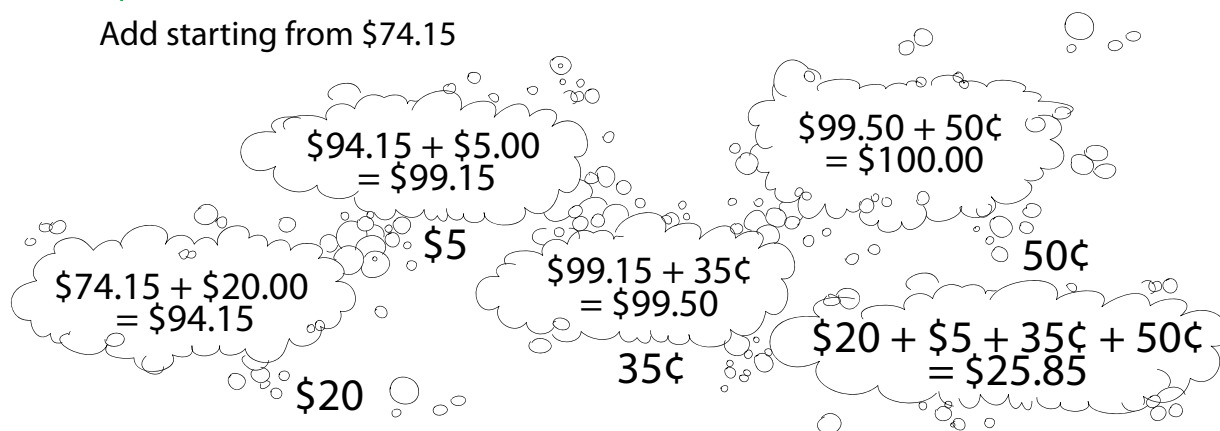
Add starting from \$14.35



EXAMPLE 2

You buy a watch for \$74.15 with a \$100 bill. How much change should you get back?

Add starting from \$74.15



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S-15

Sample Strategies

Find the time difference

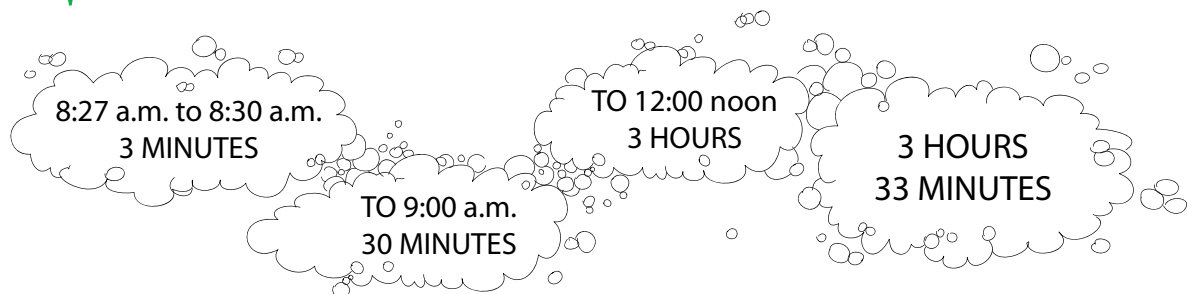
Mental math calculation is useful to find how much time is left before an event.



To find the difference between two given times, add by steps.

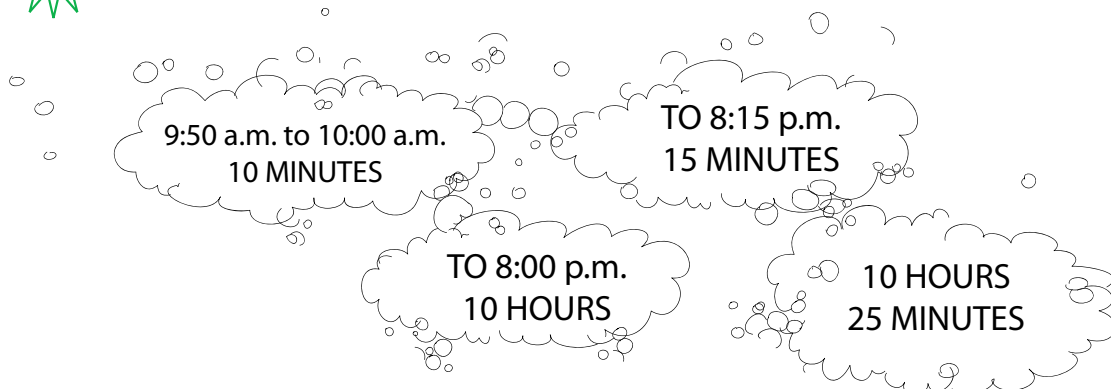
EXAMPLE 1

If it is 8:27 a.m., how long do you have to wait before lunch at noon?



EXAMPLE 2

If it is 9:50 a.m., how much time is there before 8:15 p.m.?



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S-16

Sample Strategies

Change quarter fractions to a decimal or a percent

When converting quarters, you can think of the context of money where 1 dollar is the whole and the fractions are the number of coins called “quarters.” The fraction, $\frac{3}{4}$, is read, “three quarters.” The value of three quarters is \$0.75, which is $\frac{3}{4}$ of a dollar or 75% of a dollar. Similarly, you can do these conversions by thinking of the context of money:

$$\frac{1}{4} = \text{one quarter} = 0.25 = 25\%$$

$$\frac{2}{4} = \text{two quarters} = 0.50 \text{ or } 50\%$$

$$\frac{4}{4} = \text{four quarters} = 1.00 = 100\%$$

$$\frac{5}{4} = \text{five quarters} = 1.25 \text{ or } 125\%$$

You can also think of the context of dollars when dividing by quarters.

EXAMPLE 1 $\frac{3}{0.25} = 12$

Think of 3 dollars divided into a group of quarters. There are 12.

EXAMPLE 2 $\frac{5}{0.25} = 20$ or $5 \div \frac{1}{4} = 20$

Think of 5 dollars divided into a group of quarters. There are 20.

Another context that can be useful is time on a clock. Thinking of quarters can help you change fractions of an hour to minutes in time questions where the whole is 1 hour. There are 60 minutes in one hour and $60 \div 4 = 15$. Therefore, one-quarter of an hour is 15 minutes.

$$\frac{1}{4} = \text{one-quarter of an hour} = 15 \text{ minutes}$$

$$\frac{3}{4} = \text{three-quarters of an hour} = 45 \text{ minutes}$$

$$\frac{2}{4} = \text{two-quarters of an hour} = \text{half an hour} = 30 \text{ minutes}$$

EXAMPLE 3 Write 2 h, 15 min. in units of hours.

15 minutes is a quarter of an hour. It is equal to 2.25 hours.

EXAMPLE 4 Write 4.75 hours as hours and minutes.

0.75 is the same as three-quarters and three-quarters of an hour is 45 minutes. It is equal to 4 h, 45 min.