Surds

Simplify the following:

1      $\sqrt{5000}$
2      $\sqrt{80}$
3      $\sqrt{600}$
4      $\sqrt{2550}$
5      $\sqrt{500}$
6      $\sqrt{320}$
7      $\sqrt{2187}$
8      $\sqrt{450}$
9      $\sqrt{520}$
10      $\sqrt{980}$

Simplify:

1      $\dfrac{\sqrt{7}}{\sqrt{3}}$
2      $\dfrac{\sqrt{24}}{\sqrt{48}}$
3      $\dfrac{\sqrt{35}}{\sqrt{63}}$
4      $\dfrac{\sqrt{55}}{\sqrt{132}}$
5      $\dfrac{\sqrt{32}}{\sqrt{72}}$

Rationalise

1      $\dfrac{\sqrt{7}}{\sqrt{3}+3}$

2      $\dfrac{3\sqrt{5}}{8+\sqrt{5}}$

3      $\dfrac{\sqrt{28}}{15+\sqrt{8}}$

4      $\dfrac{\sqrt{24}}{18-2\sqrt{3}}$

5      $\dfrac{\sqrt{507}}{4+3\sqrt{13}}$

6      $\dfrac{5+\sqrt{5}}{10+\sqrt{15}}$

7      $\dfrac{3-\sqrt{21}}{\sqrt{12}+3\sqrt{7}}$

Functions

$$f(x) = 2x^3 + 3x^2$$

$$h(x) = \frac{5x - 2}{5}$$

$$g(x) = \sqrt{x} + x$$

Find the value of the following:

1 $g(16)$

2 $f(5)$

3 $h(4)$

4 $fh(-3)$

5 $hg(16)$

6 $fg(9)$

7 $h^{-1}(x)$

Product Rule for Counting

1   Seven cards contain the following letters: A C E F L M P

     Jake wants to know how many different ways there are of selecting five letters.

2   Joanne was born on 14th February 1990.

     She makes a four digit code using the numerical version of her date of birth.

     The code must not begin with zero and must have four different digits.

     How many different codes can she make?

3   To raise money for a charity, Bill decided to run a lottery similar to the National Lottery. He
     charged 25p per lottery ticket. The lottery consisted of two parts.

     The first involved three numbers which fell in the range $01 \leq n \leq 15$. Once a number has
     been picked, it is removed from the available numbers.

     The second part of the lottery involved the consonants in the alphabet. Participants select
     two letters. Once a letter has been selected, it is removed from the available letters for
     future picks.

     Bill wants to know how much prize money he should offer. He wants to make £5000 profit
     for the charity and he thinks he will sell $\frac{1}{20}$ of the available tickets.

     Unlike the lottery, all tickets are unique so there are no repeated numbers.

     The prizes are split in 50% for first prize, 30% for second prize and 20% for third prize. How
     much money should he offer for each prize?