

Dr Oliver Mathematics

Approximating Square Roots

The following short-cut is a good way of approximating a square root of a whole number.

1. $\sqrt{13}$?

Solution

Well,

$$9 < 13 < 16 \Rightarrow 3 < \sqrt{13} < 4.$$

We will take '3' as the first number.

What is the difference between '13' and '9'? The answer is '4'.

Now, double the first number. The answer is '6'.

And that is the answer:

$$\sqrt{13} \approx 3\frac{4}{6} = \underline{\underline{3\frac{2}{3}}}.$$

The answer is

$$\sqrt{13} = 3.605\ 551\ 275 \text{ (FCD)}.$$

2. $\sqrt{33}$?

Solution

Well,

$$25 < 33 < 36 \Rightarrow 5 < \sqrt{33} < 6.$$

We will take '5' as the first number.

What is the difference between '33' and '25'? The answer is '8'.

Now, double the first number. The answer is '10'.

And that is the answer:

$$\sqrt{33} \approx 5\frac{8}{10} = \underline{\underline{5\frac{4}{5}}}.$$

The answer is

$$\sqrt{33} = 5.744\ 562\ 647 \text{ (FCD)}.$$

3. $\sqrt{50}$?

Solution

Well,

$$49 < 50 < 64 \Rightarrow 7 < \sqrt{50} < 8.$$

We will take '7' as the first number.

What is the difference between '50' and '49'? The answer is '1'.

Now, double the first number. The answer is '14'.

And that is the answer:

$$\sqrt{50} \approx 7\frac{1}{14} = \underline{\underline{7.0714285}}.$$

The answer is

$$\sqrt{50} = 7.071067812 \text{ (FCD)}.$$

4. $\sqrt{126}$?

Solution

Well,

$$121 < 126 < 144 \Rightarrow 11 < \sqrt{126} < 12.$$

We will take '11' as the first number.

What is the difference between '126' and '121'? The answer is '5'.

Now, double the first number. The answer is '22'.

And that is the answer:

$$\sqrt{126} \approx 11\frac{5}{22} = \underline{\underline{11.227}}.$$

The answer is

$$\sqrt{126} = 11.22497216 \text{ (FCD)}.$$

5. $\sqrt{205}$?

Solution

Well,

$$196 < 205 < 225 \Rightarrow 14 < \sqrt{205} < 15.$$

We will take '14' as the first number.

What is the difference between '205' and '196'? The answer is '9'.

Now, double the first number. The answer is '28'.

And that is the answer:

$$\sqrt{205} \approx 14\frac{9}{28} = \underline{\underline{14.32142857}}.$$

The answer is

$$\sqrt{205} = 14.317\ 821\ 06 \text{ (FCD).}$$

6. $\sqrt{1102}$?

Solution

Well,

$$1089 < 1102 < 1156 \Rightarrow 33 < \sqrt{1102} < 34.$$

We will take '33' as the first number.

What is the difference between '1102' and '1089'? The answer is '13'.

Now, double the first number. The answer is '66'.

And that is the answer:

$$\sqrt{1102} \approx 33\frac{13}{66} = \underline{\underline{33.19\dot{6}}}.$$

The answer is

$$\sqrt{1102} = 33.196\ 385\ 35 \text{ (FCD).}$$

7. $\sqrt{3042}$?

Solution

Well,

$$3025 < 3042 < 3136 \Rightarrow 55 < \sqrt{3042} < 56.$$

We will take '55' as the first number.

What is the difference between '3042' and '3025'? The answer is '17'.

Now, double the first number. The answer is '110'.

And that is the answer:

$$\sqrt{3042} \approx 55\frac{17}{110} = \underline{\underline{55.15\dot{4}}}.$$

The answer is

$$\sqrt{3042} = 55.154\ 328\ 93 \text{ (FCD).}$$