When will it be possible for us to think seriously about colonizing Mars?

The Moon is likely to become the industrial hub of the Solar System, supplying the rocket fuels for its ships, easily obtainable from the lunar rocks in the form of liquid oxygen.

The reason lies in its gravity.

Because the Moon has only an eighth of the Earth’s mass, it requires 97 percent less energy to travel the quarter of a million miles from the Moon to Earth's orbit than the 200 journey from Earth’s surface into orbit!

This may sound fantastic, but it is easily calculated.

To escape from Earth in a rocket, one must travel at seven miles per second.

The comparable speed from the Moon is only 1.5 miles per second.

Because the gravity on the Moon’s surface is only a sixth of Earth’s (remember how easily the Apollo astronauts bounded along), it takes much less energy to accelerate to that 1.5 miles per second than it does on Earth.

Moon-dwellers will be able to fly in space at only three percent of the cost of similar journeys by their terrestrial cousins.

Arthur C. Clarke once suggested that a revolutionary idea passes through three phases:

1 ‘It’s impossible — don’t waste my time.’

2 ‘It’s possible, but not worth doing.’

3 ‘I said it was a good idea all along.’

The idea of colonising Mars — a world 160 times more distant than the Moon — will move decisively from the second phase to the third, when a significant number of people are living permanently in space.

Mars has an extraordinary fascination for would-be voyagers.

America, Russia, and Europe are filled with enthusiasts, many of them serious and senior scientists who dream of sending people to it.

Their aim is understandable.

It is the one world in the Solar System that is most like the Earth.

It is a world of red sandy deserts (hence its name — the Red Planet), cloudless skies, savage sandstorms, chasms wider than the Grand Canyon, and at least one mountain more than twice as tall as Everest.

It seems ideal for settlement.

A rocket would leave the surface of the Moon more rapidly than it leaves the surface of the Earth because of its gravity: it has only one-eightieth of the Earth’s mass.

Space travel would be cheaper from the Moon because

a) The Moon’s gravity is less than the Earth’s, so less fuel is needed to take off and

b) Liquid oxygen is easily obtainable from lunar rocks.

People will begin to seriously consider the possibility of colonizing Mars when enough people are living in space.

London is the cultural hub of the UK.

This town is the centre of the steel industry, supplying steel to the whole of the rest of the country.

The first Apollo expedition to land on the Moon brought back lots of lunar rock samples.

A battery-driven car requires far less fuel than a petrol-driven car.

If necessary, one can always consult a dictionary.

A comparable car would be considerably cheaper abroad.

Most terrestrial plants require sunshine, oxygen, and water to survive.

There has been a significant change in the attitude of ordinary people towards the Royal family since the death of Diana.

This is the only place I have visited that is anything like my home village.

When Europeans first set foot on American soil, the continent was quite clearly ideal for settlement.

The Moon could become the industrial hub of the solar system and supply spaceships.

As the Moon has only one-eightieth of the Earth’s mass, it needs 97 percent less energy to travel from the Moon to the Earth than to get from the Earth’s surface into orbit.

To escape the Earth’s gravity, you must travel at seven miles per second; to escape from the Moon is 1.5 miles per second.

Because of the low gravity on the Moon, it will need far less energy to reach that speed.

Looking back, it seems almost incredible that man only began to fly in mechanical flying machines about a hundred years ago.

Since the first experimental flights in small, frail, home-made aircraft, the science has developed to a point where millions regularly fly around the earth in large jet-propelled aircraft that will carry hundreds of people.

Not only has man flown around the Earth, in the Earth’s atmosphere, but he has also taken the first steps towards travel in space.

Men have walked on the Moon, and men have set up space stations and hundreds of satellites in orbit around the Earth.

If this incredible development has taken place in such a short time, what might space travel be like in fifty years?

It is almost impossible to say.

Even at this moment (early in 1999), the Americans and Russians are cooperating in the construction of the largest space station in Earth’s orbit.

From there, and once it is operating properly, who knows what the future might hold?

It will act as the launch pad for flights to other planets, and then the Moon must surely be the site for the first human colony in space.

Men have always been pioneers, and for many years, space has been regarded as ‘the last frontier’.

Escaping the Earth’s gravity was the first challenge, setting up orbiting space stations the next, and colonizing the Moon will be the next.

But after that?

Surely we must aim for Mars, the ‘Red Planet’, the planet which we are told is most like ours in the Solar System.

After that, other planets beckon in our Solar system, and even beyond that, millions of light years away, are thousands and thousands of other worlds.

But let’s just ‘come back down to Earth’ again for a moment.

For many people, the next fifty years could well bring the Ultimate Holiday.

How would you like to travel around the Earth in an orbiting space station or even in a shuttle in a few hours?

If you can afford it, you will almost certainly be able to in a few years.

The question is: Will you want to?

Or would you rather leave the Earth completely, become a space pioneer, and emigrate to a different planet?

It feels very hot today.

This chocolate seems/tastes very bitter.

You can see from her face that she doesn’t feel well. (She looks unwell.)

The price sounds/seems about right, but I hope they can offer us a bigger discount.

How much did you say? That sounds/seems expensive!

Japan is an industrial nation.

The Japanese people are very industrious.

Who supplies you with fresh vegetables?

Our parents provided us with everything we needed while we were growing up.

His new novel had less success than expected.

This is a lesser problem compared with pollution.

A great black dog came bounding out towards us.

There are no bounds to his ambition.

Don’t bind that so tight.

A bandage bound as tightly as that will restrict the patient’s circulation.

Where are you bound for? — I’m off to Scotland for a week.

It’s hard to imagine that anyone could fly some of the old planes you see in museums.

Originally, the river flowed several miles north of this point.

Whose idea was it that we should invite him?

You’ll find an ideal place for a picnic on the other side of the lake.

There isn’t much news about the missing climbers, but at least we know they’re safe.

After days of anxiety, at last, we learned the climbers were safe.

In my opinion, this laptop computer is the only one that is light enough to carry when you're traveling.

Some of the buildings that were put up in the 1960s are in very bad shape.

The giant panda is one of those animals that is most at risk of extinction.

There are a lot of people who are prepared to take business risks.

I think it was your mother who answered the phone.

The moon is likely to become the center of the Solar System because it will be cheaper and easier to launch rockets from there.

Compared with the Earth, you need to travel at far less speed to take off from the moon.

We will only be ready to think of colonizing Mars when quite a few people have permanently left Earth.

According to the writer, Mars seems ideal for settlement because it is the planet that most closely resembles Earth.

If you want to escape from Earth in a rocket, you must travel...

How much energy does it take to accelerate 1.5 miles per second?

Not until a significant number of people are living in space can we move from the second phase to the third.

Many serious and senior scientists are full of enthusiasm.

This may sound amazing, but it is easily calculated.

They will be able to fly at only three percent of the cost of journeys by their terrestrial cousins.

I said it was a good idea all the time.

Mars has an extraordinary fascination for would-be travelers.