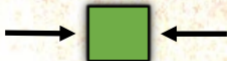


SOURCES, ORIGINS, IRON
AND STEEL

This mobile revision pdf is based on detailed work found in the MATERIALS section.

Tap on the green link button below to go to the complete website section



Tap the blue button to view areas covered by this Revision PDF



SOURCES, ORIGINS, IRON AND STEEL

1. IRON ORE TO IRON ORE PELLETS

2. WHERE IS IRON ORE MINED?

3. THE BLAST FURNACE - IRON PRODUCTION

4. PRODUCING STEEL THROUGH THE MODERN CONVERTER PROCESS

5. STOCKFORMS - METALS

DOWNLOAD THE APP:

**“MATERIALS -WOODS - METALS –
PLASTICS”** from the Apps section of
www.technologystudent.com

For information regarding a range of
metals.

IRON ORE TO IRON ORE PELLETS

(1)

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Steel is the most common metal used by man. It is used in the construction of our buildings, bridges, aircraft, cars, ships and many everyday items. Without steel, our modern industrial world would not exist.

In order to produce steel, iron ore is required, in large quantities. Iron ore is dug out of the ground from open cast mines or mined deep underground. The ore is crushed into a fine powder, mixed with water, making a slurry. Clay is added to the slurry and the mixture shaped into pellets and baked, forming a hard shell. The pellets are sent to a steel mill in order to extract the iron which is normally converted into steel.

Tap the link button for more information and exercises



Tap the blue button for the next page.



Tap the red button to return to the Contents page

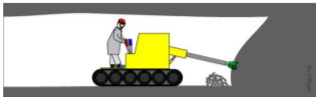


IRON ORE TO IRON ORE PELLETS(2)

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Tap the images for more information and exercises

1. MINING UNDERGROUND



2. STORED AT MINE SURFACE - REMOVED FOR PROCESSING



3. IRON ORE ROCKS SEPARATED FROM OTHER MATERIAL



Tap the blue button for the next page.



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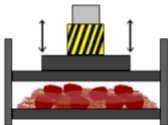


IRON ORE TO IRON ORE PELLETS(3)

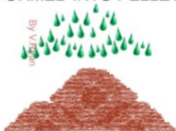
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4. ROCKS CRUSHED TO POWDER - HYDRAULIC PRESS



5. MIXED WITH WATER AND CLAY - FORMED INTO PELLETS



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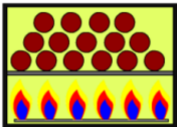


IRON ORE TO IRON ORE PELLETS(4)

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6. PELLETS BAKED IN LARGE SCALE OVEN



7. IRON ORE PELLETS



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WHERE IS IRON ORE MINED?

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Iron ore can be found all over the world, in the form of rocks and other minerals. To be economically viable for mining, iron ore must contain at least 20% iron. Magnetite ore has the highest proportion of iron, at 65%. Haematite ore also has a high content of iron at 60%. All iron ore contains ferric oxide and it is from this that iron is extracted. Approximately two billion tonnes of iron ore are mined each year.

Tap the link button
for more information
and exercises



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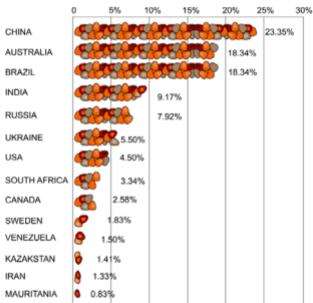


WHERE IS IRON ORE MINED?

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The pictogram / graph below, shows the world distribution of iron ore mining. China, Australia and Brazil dominate this world trade.

Tap the image for more information and an exercise



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THE BLAST FURNACE - IRON PRODUCTION

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A simplified diagram of a Blast Furnace is drawn on the next page. A typical blast furnace may be up to 32 metres in height and 10 metres in diameter. They have thick steel sides, lined with refractory bricks, to ensure that heat is not lost. Blast furnaces are used continuously and are only shut down when their brick lining needs replacing.

As the mixture of iron ore, coke and limestone heats, the hot waste gases are collected and cleansed. They are then used to help heat the air blast, required if blast furnace is to reach the high temperatures needed to produce molten iron.

Tap the link button
for more information
and exercises



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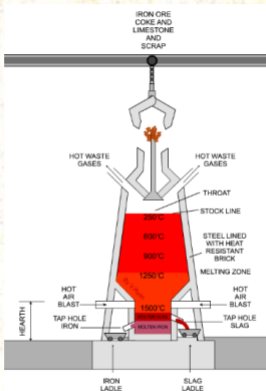
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THE BLAST FURNACE

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Tap the image for more information and exercises



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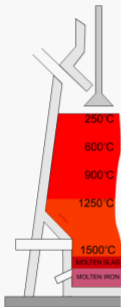
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PROCESSES INSIDE THE BLAST FURNACE

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Tap the image for more information and exercises



MOISTURE EVAPORATES.
LIMESTONE BEGINS TO DECOMPOSE.
CO₂ GIVEN OFF.
STOCK BECOMES POROUS



OXYGEN REMOVED FROM IRON OXIDES.
MATERIALS SUCH AS SILICA AND ALUMINA
SEPARATED OUT.



REACTIONS SPEED UP AS STOCK DESCENDS

OXYGEN REMOVED FROM IRON OXIDES.
MATERIALS SUCH AS SILICA AND ALUMINA
SEPARATED OUT.



MOLTEN IRON TAPPED.
SLAG TAPPED. THE SLAG FLOATS ABOVE THE
IRON BECAUSE IT IS LIGHTER.

Tap the red button to return to the
Contents page

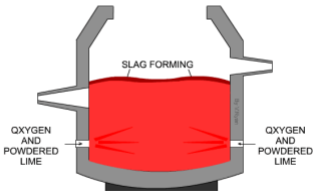


PRODUCING STEEL THROUGH THE MODERN CONVERTER PROCESS

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Molten iron is transported from the blast furnace to a steel furnace, sometimes called a 'converter'. At the converter, molten iron is added to scrap iron / steel which lowers the temperature, as it acts as an impurity. A high pressure stream of oxygen and powdered lime, is blow through the mixture, causing chemical reactions, removing some of the carbon from the iron.

Tap the image for more information and exercises



Tap the blue button for the next page.



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PRODUCING STEEL THROUGH THE MODERN CONVERTER PROCESS

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The amount of carbon removed from the iron determines the quality / grade of steel produced.

The waste (called slag) floats to the top and is poured off, before the molten steel is poured.

The molten steel is poured into moulds, forming 'blooms'. It is common for the blooms to be formed into the final products, by forcing them through a number of rollers, such as steel rails for the railways.

Tap the image for more information and an exercise

GRADE OF STEEL	PERCENTAGE OF CARBON
LOW CARBON STEEL	0.0 TO 0.1
MILD STEEL	0.1 TO 0.33
MEDIUM CARBON STEEL	0.34 TO 0.6
HIGH CARBON STEEL	0.6 TO 0.9
TOOL STEEL	0.9 TO 1.3

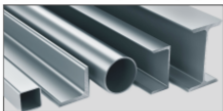
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PROFILES AND HOLLOW SECTIONS



profile (size) x length



I-SECTION



T-SECTION



L-SECTION



CIRCULAR
SECTION



SQUARE
SECTION



U-SECTION

Tap the blue button for the next page.



Tap the red button to return to the
Contents page



Tap the image for more information and exercises

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SOLID / BAR SECTIONS AND RODS



length x width x thickness



SQUARE



ROUND



FLATS



HEXAGONAL



OCTAGONAL

Tap the blue button for the next page.



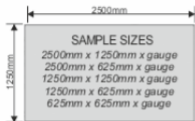
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METAL SHEETS A VARIETY OF SIZES AVAILABLE



SAMPLE THICKNESSES

GAUGE: 16 19 20 22 26 30



SIZE IN mm: 1.30 0.92 0.82 0.64 0.40 0.25

Tap the red button to return to the
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