

**Mass and Energy****Checklist statement**

✓

I can explain that $E = mc^2$ applies to all energy changes.

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I can apply $E = mc^2$, define all terms and know their standard units.

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I can perform calculations involving mass difference and binding energy.

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I can define the atomic mass unit, u .

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I can convert between atomic mass units and energy using $1 u = 931.5 \text{ MeV}$.

☐

I can describe fission and fusion processes.

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I can calculate the energy released in fission and fusion reactions using nuclear masses.

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I can interpret a graph of average binding energy per nucleon against nucleon number.

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I can identify regions on the binding energy graph where energy is released by fission or fusion.

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I can explain how understanding nuclear energy allows science to inform societal decision-making.

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Induced Fission**Checklist statement**

✓

I can explain how fission is induced by thermal neutrons.

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I can explain the possibility of a chain reaction and the concept of critical mass.

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I can describe the functions of the moderator, control rods and coolant in a thermal nuclear reactor.

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I can explain moderation in terms of elastic collisions.

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I can explain factors affecting the choice of materials for moderators, control rods and coolants.

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I can give examples of materials used for moderators, control rods and coolants.

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Safety Aspects

Checklist statement

✓

I can describe the fuel used in nuclear reactors.

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I can explain the need for remote handling of nuclear fuel.

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I can explain the purpose of shielding in nuclear power stations.

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I can describe emergency shutdown procedures in nuclear reactors.

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I can explain the production, remote handling and storage of radioactive waste materials.

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I can discuss the balance between risks and benefits in the development of nuclear power.

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