

getting the physics straight

heating by radiation depends on surface area

resultant forces change motion

gravity is a force that acts at a distance

rays can be used to predict where shadows will fall

forces are exerted by the object's environment, however large the

representing the topic effectively

use the SPT: Forces topic approach to interactions

use the SPT: Light topic approaches to modelling with rays

using a few coherent models well

particular teaching challenges

developing a sense of scale

not getting buried in detail about astronomical objects

keeping the physics of the situations to the fore

moving, three dimensional situations

relate the very large scale to the laboratory understandings

undermining locally developed intuitions

gravity force as action-at-a-distance

weight and weightlessness described coherently

the non-locality of up and down

force changes motion, it does not cause motion

scales in distance and time

unusual units of measurement, or very big numbers

dealing with existing ideas

falling depends on inherent properties of an object

gravity is a local effect only, not applying in space or on the moon

satellites have their own laws of motion

conflating planets, stars and other astronomical objects

surprising ideas about day and night

surprising ideas about reasons for seasons

selected teaching principles

retain a sense of awe that we know anything at all of remote objects

linking ideas from different areas

geometry, plus illumination, plus movement to account for eclipses,

geometry, plus illumination, plus movement to account for the seasons

patterns in astronomical data related to illumination and gravity forces

draw out existing ideas about seasons, day and night, and phases