

# Graphical Antiderivatives

## ANSWER BOOKLET

By Caroline Yoon, Tommy Dreyfus,  
Tessa Miskell and Mike Thomas

**5** The **LEMMA** series:  
Learning Encounters with  
Meta-Mathematical Activities

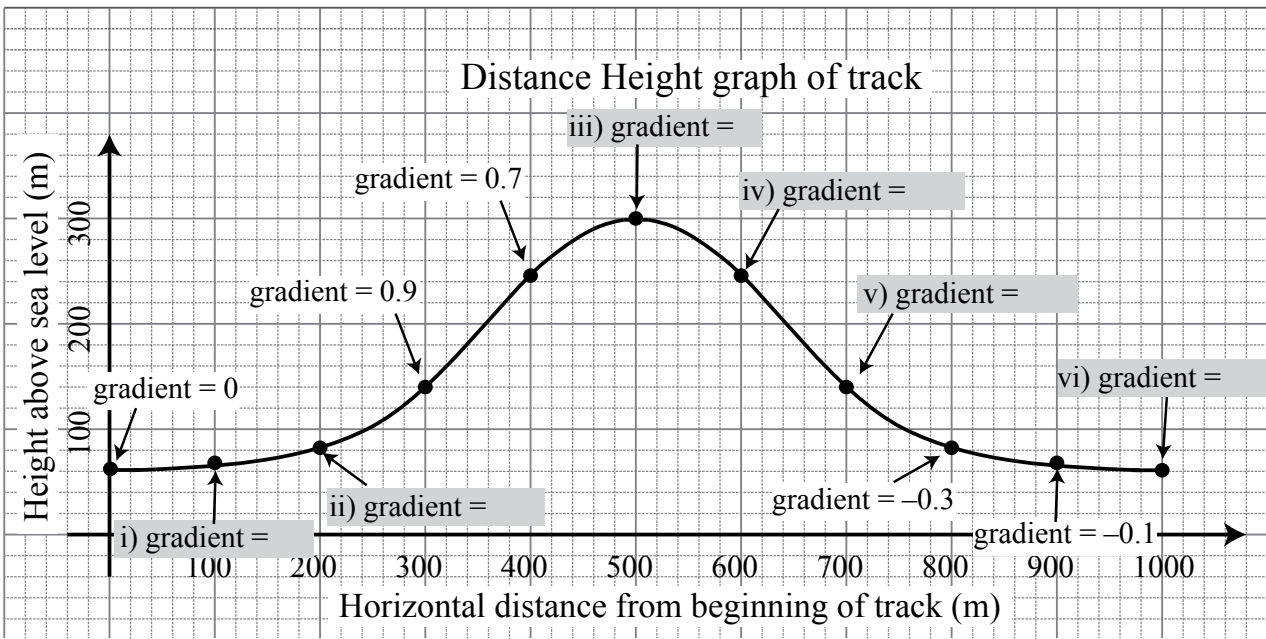
 **NZCER**  
NEW ZEALAND COUNCIL FOR  
EDUCATIONAL RESEARCH

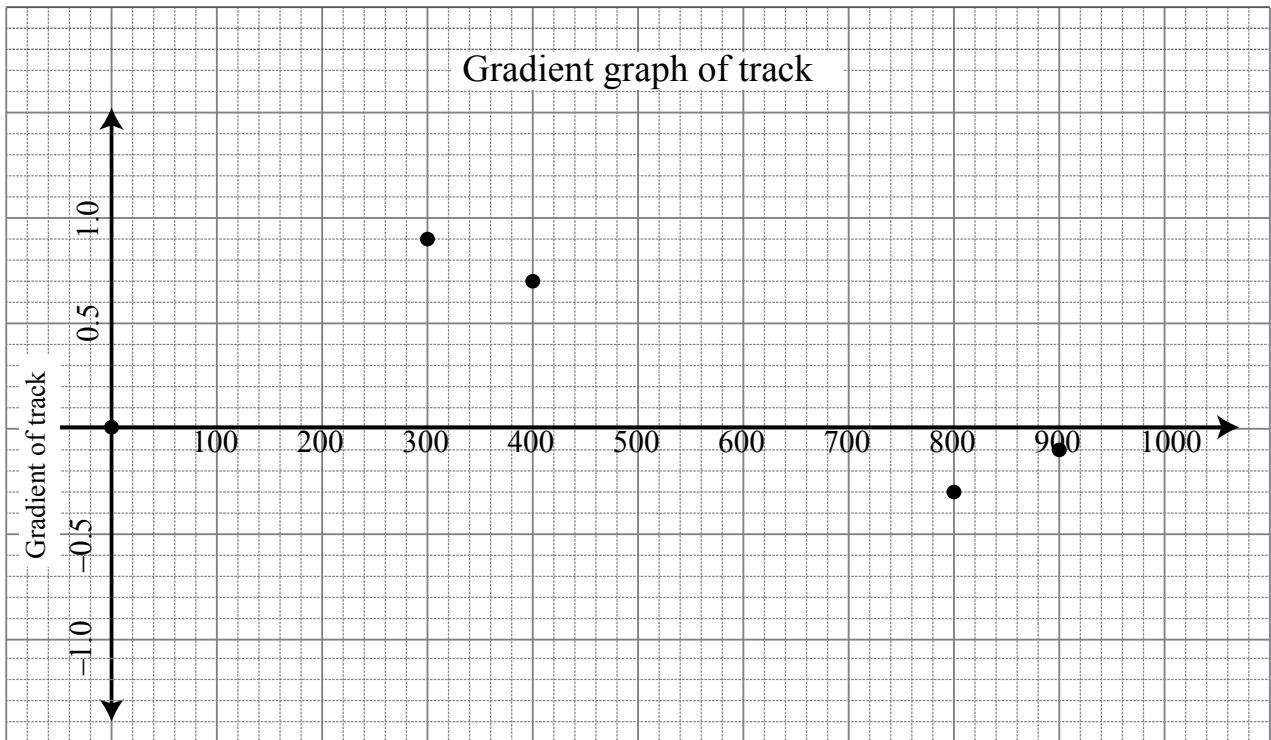


New Zealand National  
Commission for UNESCO  
*To Kāwhiriāna Matua o Aotearoa mō UNESCO*

### Warm-up task

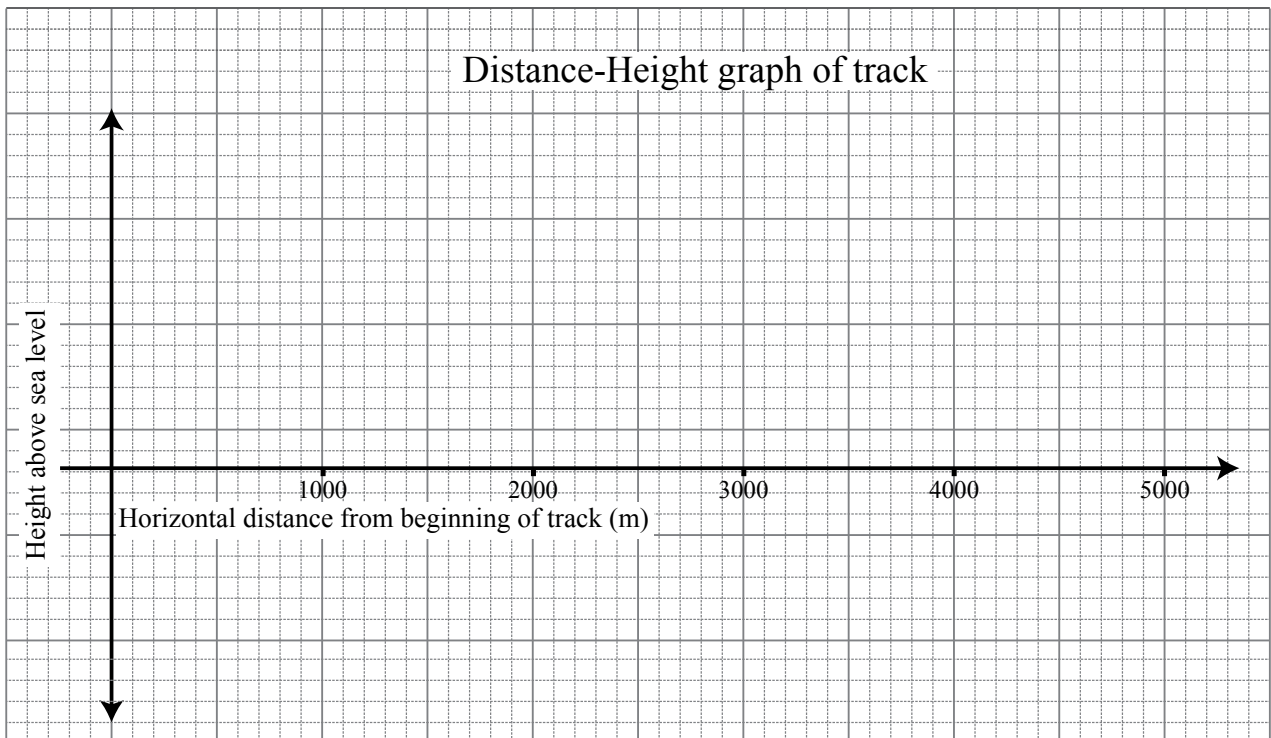
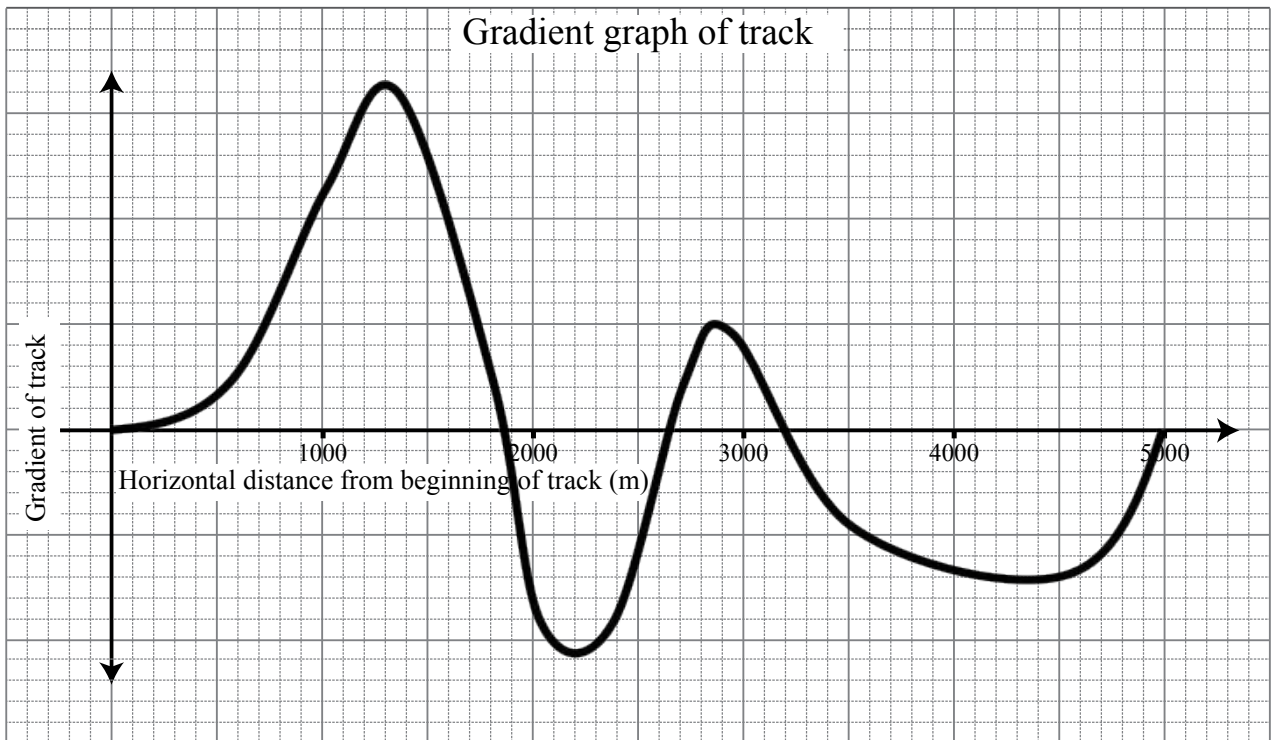
1. ....
2. ....
3. ....
4. ....
5. ....
6. ....
7. ....
8. ....



**9. and 11.**

**10.** .....

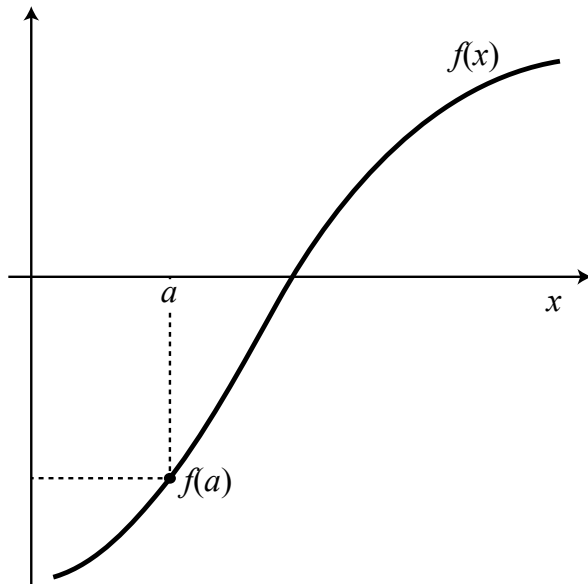
## Task 1: The tramping problem



A series of horizontal dotted lines for writing answers.

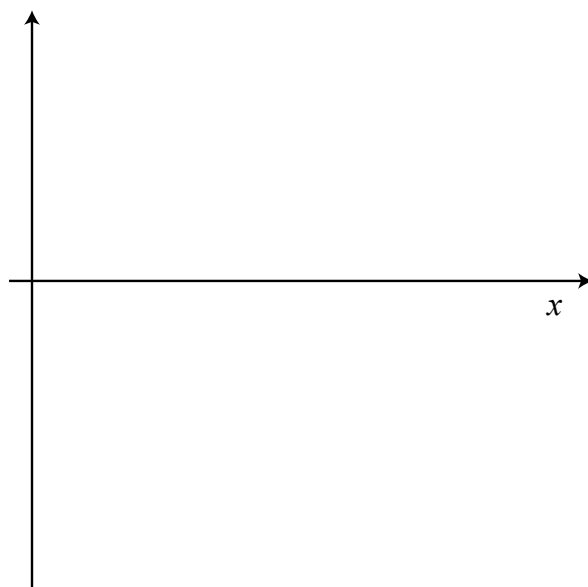
### Task 2: Identifying maxima and minima

1.



- (a) .....
- (b) .....
- (c) .....

((d)



2. (a) Correct: .....

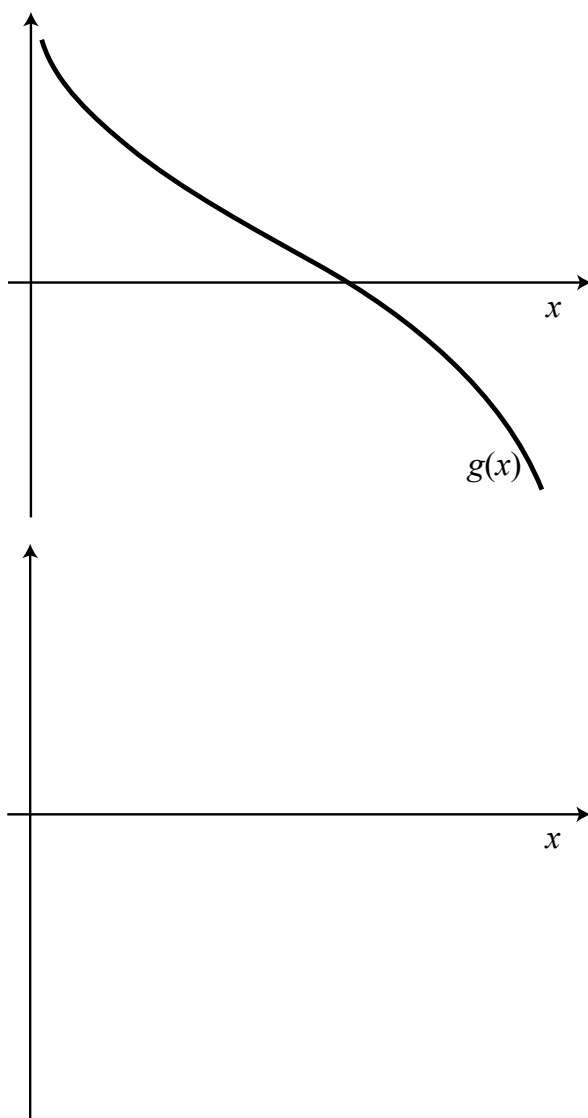
Incorrect: .....

(b) .....

(c) .....

.....

3. (a)



(b) .....

.....

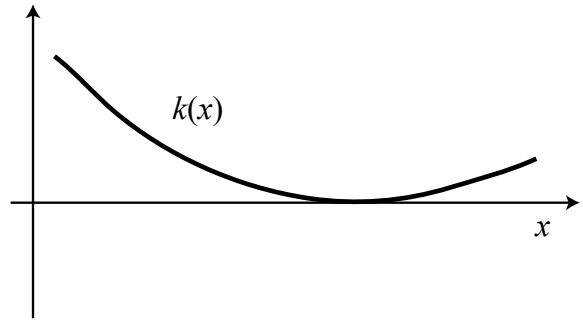
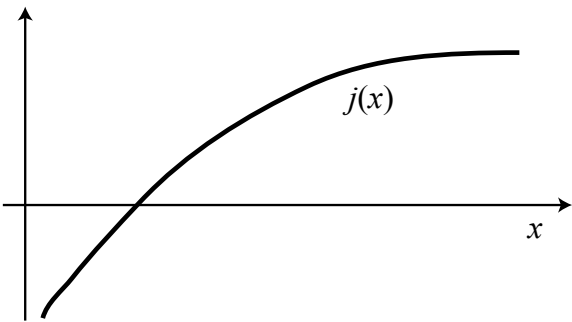
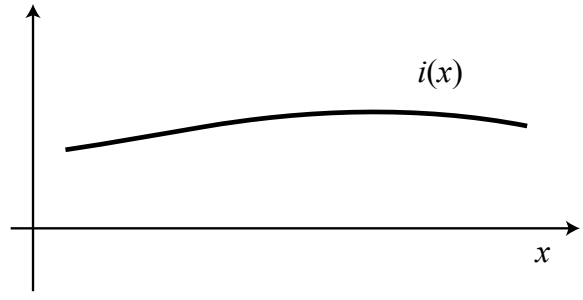
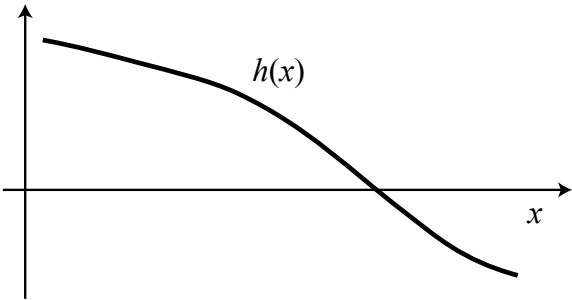
.....

(c) .....

.....

.....

(d)



(e) .....

.....

.....

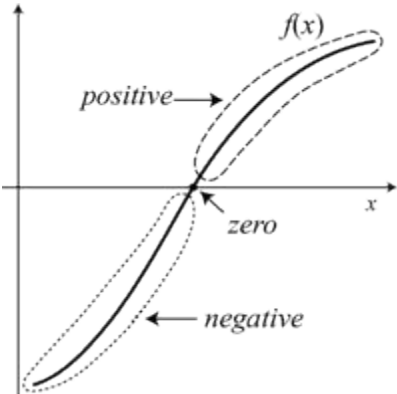
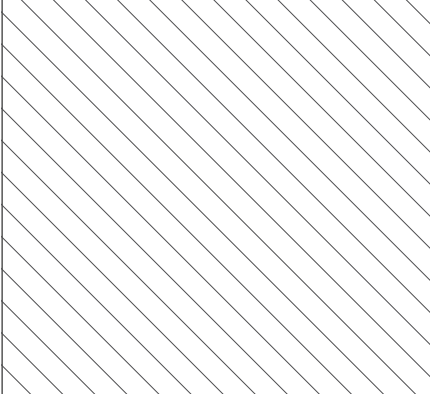
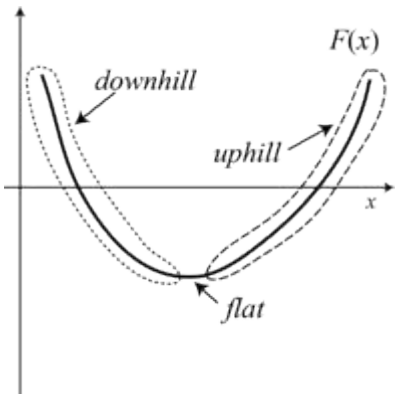
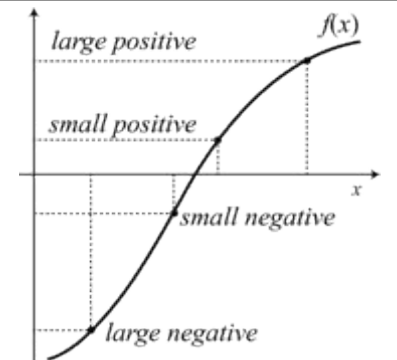
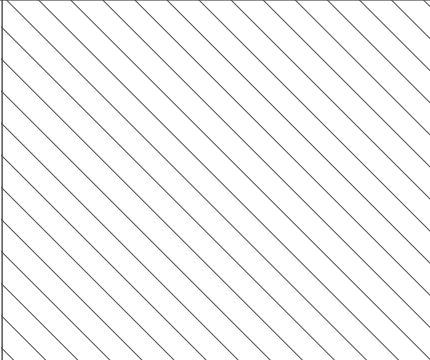
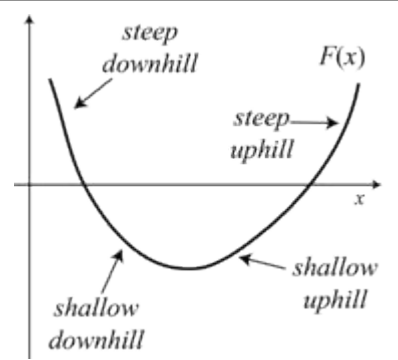
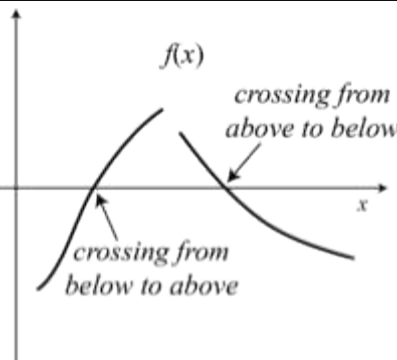
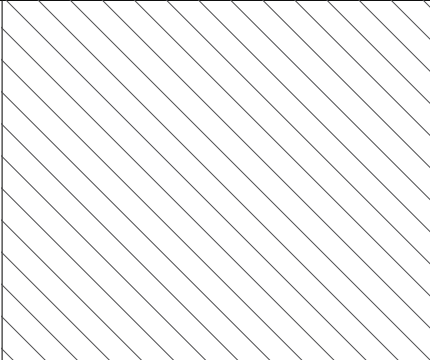
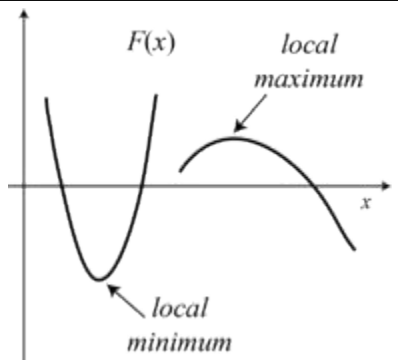
.....

.....

.....



4.

Value of the function $f$	Gradient of $F$ , an antiderivative of $f$	$F$ looks like
 <p>A graph of a function <math>f(x)</math> on a coordinate system. The curve starts in the lower-left quadrant, crosses the x-axis, and ends in the upper-right quadrant. Labels indicate 'positive' above the x-axis, 'zero' at the intersection, and 'negative' below the x-axis.</p>	 <p>A rectangular area filled with diagonal hatching lines, representing a constant positive gradient.</p>	 <p>A graph of a function <math>F(x)</math> showing a curve that first slopes downwards and then slopes upwards. Labels indicate 'downhill' and 'uphill'.</p>
$f(x) > 0$	Positive	Uphill
$f(x) < 0$	Negative	(a)
(b)	(c)	Flat
 <p>A graph of a function <math>f(x)</math> with four distinct regions: 'large positive' (high positive values), 'small positive' (low positive values), 'small negative' (low negative values), and 'large negative' (high negative values).</p>	 <p>A rectangular area filled with diagonal hatching lines, representing a constant negative gradient.</p>	 <p>A graph of a function <math>F(x)</math> showing a curve with four distinct slopes: 'steep downhill', 'steep uphill', 'shallow downhill', and 'shallow uphill'.</p>
$f(x)$ is small and positive	(d)	Shallow uphill
(e)	Large and positive	(f)
(g)	Small and negative	(h)
$f(x)$ is large and negative	(i)	(j)
 <p>A graph of a function <math>f(x)</math> showing two points where the curve crosses the x-axis. Labels indicate 'crossing from below to above' and 'crossing from above to below'.</p>	 <p>A rectangular area filled with diagonal hatching lines, representing a constant negative gradient.</p>	 <p>A graph of a function <math>F(x)</math> showing a curve with a 'local minimum' and a 'local maximum'.</p>
Crosses $x$ -axis from below to above	Changes from negative to positive	(k)
(l)	(m)	Peak (local maximum)