

Name: _____

WORKSHEET

Parallelogram rule for vector addition

1 Use the parallelogram rule to find the sum of the following pairs of displacement vectors.

a $(4, 0^\circ)(3, 90^\circ)$

b $(3, 180^\circ)(4, 90^\circ)$

c $(5, 180^\circ)(2, 270^\circ)$

d $(6, 270^\circ)(4, 0^\circ)$

e $(3, 45^\circ)(2, 60^\circ)$

f $(5, 150^\circ)(7, 30^\circ)$

g $(3, 120^\circ)(4, 225^\circ)$

h $(3, 315^\circ)(2, 45^\circ)$

i $(7, 330^\circ)(4, 195^\circ)$

j $(4, 210^\circ)(8, 120^\circ)$

k $(10, 130^\circ)(3, 240^\circ)$

l $(0.5, 350^\circ)(2.5, 20^\circ)$

m $(6.2, 163^\circ)(5.9, 247^\circ)$

n $(3.1, 72^\circ)(2.3, 292^\circ)$

2 Given **a** = $(5, 45^\circ)$, **b** = $(3, 120^\circ)$, **c** = $(4, 265^\circ)$ and **d** = $(7, 300^\circ)$ find the following:

a **a** + **b**

b **a** + **c**

c **b** + **c**

d **c** + **d**

e **a** + **d**

f **d** + **b**

3 A boat sailed at 12 knots for one hour heading $N65^\circ W$. Find the displacement of the boat relative to its starting position given the following tidal current acting on the boat.

a 4 knots, north

b 3 knots, south

c 1 knot, S15°W

d 2 knots, N60°E

e 3 knots, S65°E

f 4 knots, east

g 2 knots, N65°W

h 3 knots, S20°W

4 When a cyclist is riding north at a constant 30 km/h, they experience an 'apparent wind' of 30 km/h from the north (on a still day). Find the resulting 'apparent wind' experienced by a cyclist travelling at 30 km/h north given the following wind conditions.

a 30 km/h from the east

e 5 km/h from the north-west

b 15 km/h from the west

f 12 km/h from the south-east

c 30 km/h from the south

g 20 km/h from the south-west

d 10 km/h from the north

h 8 km/h from N10°E

Answers

- 1** a (5, 36.9°)
b (5, 126.9°)
c (5.4, 201.8°)
d (7.2, 303.7°)
e (5.0, 51.0°)
f (6.2, 73.9°)
g (4.3, 183.1°)
h (3.6, 348.7°)
i (5.0, 295.9°)
j (8.9, 146.6°)
k (9.4, 147.4°)
l (2.9, 15.1°)
m (9.0, 203.7°)
n (2.0, 24.2°)
- 2** a (6.5, 71.6°)
b (3.2, 352.0°)
c (2.31, 216.9°)
d (10.5, 287.4°)
e (7.5, 340.3°)
f (4, 300°)
- 3** a (14.2, 140.2°)
b (11.1, 169.2°)
c (11.9, 159.8°)
d (11.0, 146.4°)
e (9, 155°)
f (8.5, 143.6°)
g (14, 155°)
h (12.1, 169.3°)
- 4** a 42.4 km/h from north-east
b 33.5 km/h at 296.6°
c 0 km/h
d 40 km/h from north
e 33.7 km/h at 276.0°
f 23.1 km/h at 248.5°
g 21.3 km/h at 311.7°
h 37.9 km/h at 267.9°