



MULTI-COMBINATION
TRAINING COURSE
STUDENT MANUAL



ACCREDITED VIC ROADS PROVIDER OF HEAVY VEHICLE TRAINING & LICENCING
55 - 59 Westwood Drive, Burnside (Deer Park), Victoria 3023, Australia. Telephone: 9361 2000 Facsimile: 9361 2011
A Quality Assured Company ISO 9002 ACN 005 578 503 ABN 62 005 578 503

MULTI-COMBINATION COURSE NOTES

The Evolution of B-doubles

B-Doubles originated in Canada about 1973 and have operated in New Zealand since the late 1970's.

In Australia they were introduced into Western Australia in 1983 and Queensland in 1984 with N.S. W following almost immediately.

A study by the University of Saskatchewan in Canada proved conclusively that the crash rate of B-Doubles is only 53% of that of single articulated vehicles. If B-Doubles replaced the conventional single articulated and considering the greater payload of B-Doubles the crash rate can be reduced by 65%. It must also be noted that Canada does not have designated B-Double routes, therefore under Australia's guidelines the crash reduction should be even better.

The first B-Doubles in Victoria were milk tankers operated by Murray Goulburn in the early 1980's. Permit at that stage were \$12,000 with very limited access to roads. This operation proved to be not as efficient as expected for Murray Goulburn, however the trials did prove to be beneficial to the transport industry in certain applications.

The "Australian Road Research Board" (ARRB) has results from research that indicate that *the B-Double is more stable than a single articulated vehicle through low speed turns such as those encountered in urban intersections.*

The National Association of Australian State Road Authorities has predicted that 16 lives would be saved and 50 serious accidents would not occur annually when B-Doubles replace single articulated vehicles. To date in Australia, B-doubles are achieving a safety record 10 times better than any other road vehicle.

MULTI-COMBINATION COURSE NOTES

DOCUMENTATION

The driver of a B-Double must carry with them at all times the usual documentation relative to a heavy vehicle.

- Multi Combination Licence
- Log Book
- VicRoads information bulletins:
 - B-Double & Higher Mass Limit Trucks*
 - Local Roads Approved for B-Doubles & Higher Mass Limit Trucks*
- Any permits issued by VicRoads entitling you to use a road or roads listed in the above publications
- Dangerous Goods Licence (if applicable)
- Dangerous Goods Emergency Procedures Guide (if applicable)

PERMITS

Permits are no longer required on approved routes for B-Doubles up to 62.5 tonne.

If a B-Double moves off an approved road a permit is required.

These permits must be obtained from the appropriate council, shire or VicRoads.

When operating interstate, always check for special requirements.

WARNING

Unauthorised use of a non-approved road or failure to comply with any of the requirements in the Information Bulletin will leave the driver and operator liable for prosecution.

MULTI-COMBINATION COURSE NOTES

Power Requirements for B-Doubles

Power requirements for a B-Double are as per AUSTRROADS requirements.

- Adequate power to start from a rest position on a 10% gradient (One metre rise in ten metres)
- Maintain a speed of 70 kph on a 1% grade whilst laden.

ABS Braking System

Anti Lock Braking Systems are required to be fitted to all Prime-mover vehicles in Victoria.
Trailers involved in general freight do not require ABS Braking to be fitted.

Dangerous good vehicles must have ABS Braking fitted to all axles of the prime-mover and all trailers (specifically road tankers).

ABS Braking is not required to be fitted to road trains.

Speed Limits for B-Doubles

B-Doubles must be Road Speed limited to maximum of 100 kph.

B-Doubles must therefore not exceed 100 kph or the posted speed limit, whichever is the lesser.



MULTI-COMBINATION COURSE NOTES

Spray Suppression Devices

Spray suppression devices shall be fitted to all axle groups of a B-Double and must comply with the current standards. (Australia is currently using the British Standard AU200 – 1984 Parts 1 and 2).

These standards are currently under review as to whether they are appropriate for Australian road transport conditions.

- Mudguards must be ribbed on the underside and have a lip on the edges.
- Mudflaps must be ribbed or have a matting surface.
- Brushing may be required around wheel arches.

For certain special operations, this requirement may be relaxed.

Air Hose Connectors

All Multi Combinations vehicles require polarised hose connectors (One male fitting and one female fitting).

In Western Australia it is mandatory to have clear bore fittings to allow air to travel the greater distance with less restriction and achieve optimum braking.

MULTI-COMBINATION COURSE NOTES

Signs

Long Vehicle Sign

A warning sign shall be affixed in a horizontal position at the rear of the back trailer. The sign must be made of rigid material at least 1020 mm long X250 mm high. Retro-reflective yellow background with the words 'LONG VEHICLE'.

This sign must be mounted so that no part of it is higher than 1800 mm or less than 500 mm above the ground.

- This sign must be fitted to all B-Double configurations; the 'LONG VEHICLE' sign must  be displayed.



LONG VEHICLE

Portable Warning Signs

Heavy Vehicles over 4.5 tonnes must carry three portable warning signs.

- If your vehicle breaks down, you must place one sign to the rear and one sign to the front of the vehicle, between 50 and 150 metres from the vehicle.
- The third sign must be placed at the side of the vehicle nearest the centre of the road.

NOTE: If you have broken down in the right hand lane of a multi lane carriageway, the third sign should be to the left of the vehicle.

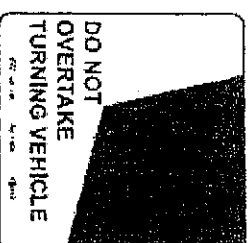
MULTI-COMBINATION COURSE NOTES

Signs cont.

Do Not Overtake Turning Vehicle Signs

This sign allows a long vehicle (over 7.5 metres) to occupy space outside

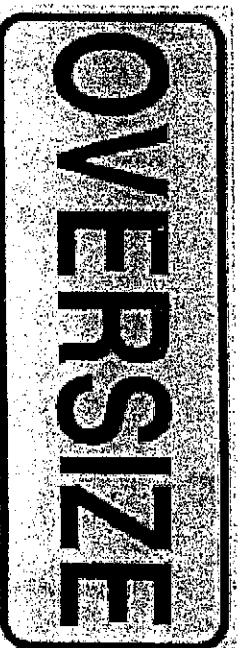
an assigned lane when turning so long as:



- The vehicle is within 50 metres from a corner.
- The move can be made safely.
- Wherever possible you should you set the back of your vehicle so that the traffic behind you cannot overtake your vehicle on the side you are turning to.

Over-Dimensional Signs

O.D. signs show approved routes for 'Over-Dimensional' vehicles (B-Doubles are not Over-Dimensional vehicles).



MULTI-COMBINATION COURSE NOTES

Following Distance for B-Doubles

When following a vehicle more than 19 metres long or more than 2.5 metres wide, a minimum distance of 200 metres must be maintained from that vehicle.

Exceptions

- When driving on a multi laned carriageway
- When overtaking
- When in a built up area



NOTE: It is recommended that the 200 metre following distance should still be maintained where ever possible, even in a built up area. This is also important when crossing bridges to help safeguard against bridge span structure damage.

MULTI-COMBINATION COURSE NOTES

Handling Characteristics

Off Tracking

The maximum allowable tolerance for off-tracking in a B-Double is 100mm. In rural conditions, additional encroachment off the shoulder compared to standard 19 metre semi-trailers is unlikely, as high speed off-tracking is relatively small. B-Doubles are capable of operating wherever semi-trailers up to 19 metres in length are operating.

Manoeuvrability

The AUSTROADS requirement is that a B-Double be able to turn 180 degrees between two walls 25 metres apart. This means that B-Double prime movers usually have more turning lock available than a lot of regulation vehicles.

NOTE:

Swept Paths

Swept paths for a 23 metre B-doubles generally fall inside those for a 19 metre semi trailer.

Factors Affecting Handling Characteristics

- Uneven surfaces, change of surface (roundabouts / intersections)
- Incorrect loading of trailers.
- Overtaking / passing. Must be careful not to drop off the shoulder due to the camber of the road.
- Over braking on one wheel or trailer, (incorrect brake adjustment or poorly maintained brakes).
- Trailer whip (ring feeder versus turntable).

MULTI-COMBINATION COURSE NOTES

B-Double Load Distribution Characteristics cont.

Figure 3 shows the B-Double with an additional 19.30 tonne load placed on the second trailer.

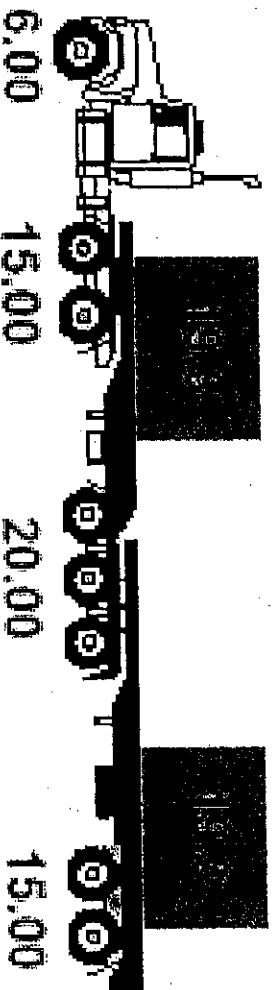


Figure 3

Notice that the prime mover axle loads in figure 3 are less than those in figure 2.

This characteristic is the result of the fifth wheel on the first trailer being positioned behind the centre of the first trailers axle group. Load applied to the fifth wheel produces movement of weight about the axle group centre which tends to lift the front of the trailer therefore reducing the weight on the prime mover, as shown in figure 3.

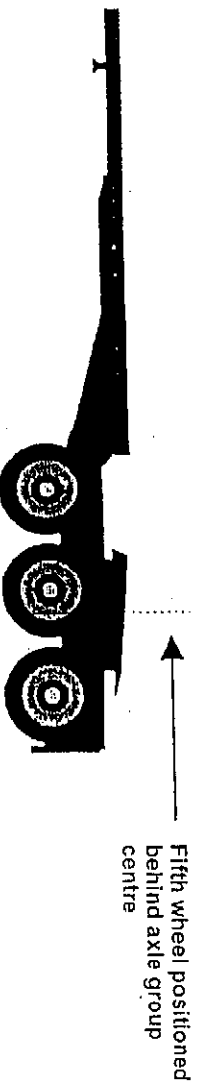


Figure 4

It is also important to understand the effects that the positioning of the load on each trailer will have on the individual axle loads.

MULTI-COMBINATION COURSE NOTES

B-Double Load Distribution Characteristics

The load distribution characteristics of a B-Double are significantly different to standard articulated vehicles.

NOTE: The weights shown in the following are an example only.

Figure 1 shows a typical B-Double configuration with axle tare weights.

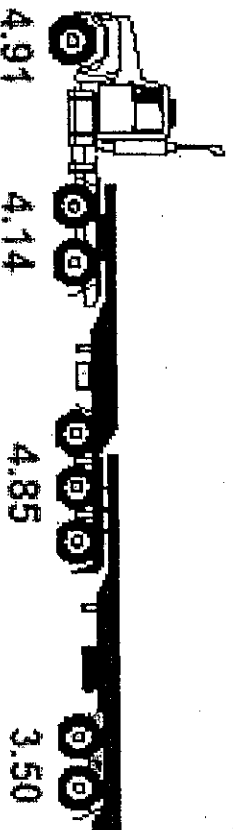


Figure 1

Figure 2 shows the same vehicle with a 19.30 tonne load on the first trailer.

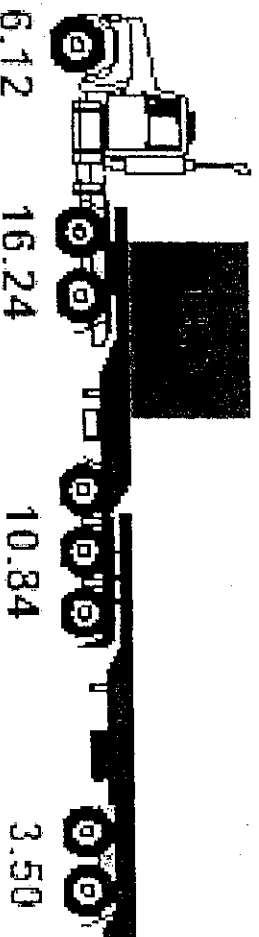
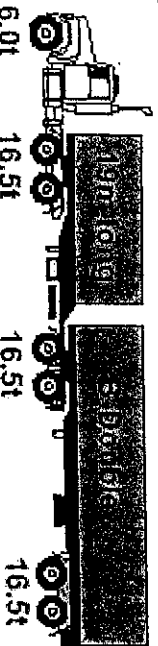

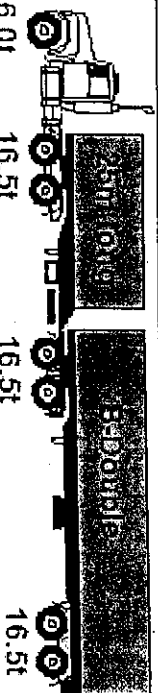
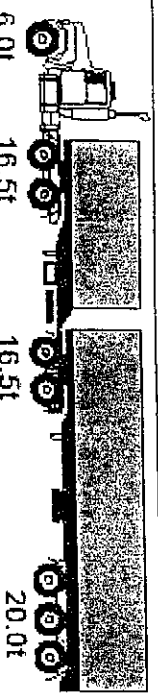
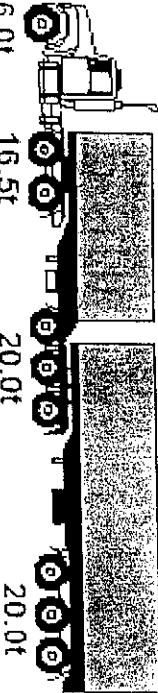


Figure 2

MULTI-COMBINATION COURSE NOTES

B-DOUBLE DIMENSIONS

	Dimension in Metres	Weight in Tonnes	Trailer Configuration
LENGTH	25.00		All B-Doubles
WIDTH	2.5		
HEIGHT	4.3 4.6		General, including load Livestock, car carriers & cubic
WEIGHT		40.50 55.50 59.00 62.50	Bogie – Single Bogie – Bogie Bogie – Tri Tri - Tri

Vehicle Type	General Mass Limits (tonnes)	
	50.0	
	55.5	
	55.5	
	59.0	
	62.5	

MULTI-COMBINATION COURSE NOTES

Handling Characteristics

B-Double Retention Questionnaire

1. In Victoria, a B-Double must be able to start from a rest position on a:

a. 10% grade b. 12% grade c. 15% grade

2. What is the maximum weight allowance for a B-Double without the need to obtain a permit?

a. 42.5 tonne b. 62.5 tonne c. 65.00 tonne

3. What is maximum allowable speed for a B-Double?

Answer:

4. On the open road, what is the following distance for a B-Double behind a vehicle 21.00 metres long?

Answer:

5. What is the maximum allowable off tracking for a B-Double?

a. 150mm b. 100mm c. 200mm

6. What is the maximum length of a B-Double?

a. 23.00 metres b. 26.00 metres c. 25.00 metres

MULTI-COMBINATION COURSE NOTES

Road Train Information

Road Train Sign

- A warning sign shall be affixed in a horizontal position to the front of the hauling unit and to the rear of the rear most trailer of all road trains.
- The sign shall consist of retro-reflective yellow background not less than 1200mm wide by 250mm high with the legend '**ROAD TRAIN**' in black letters 180mm high.
- The front warning sign shall be fixed in such a way that it is not below the bumper bar of the hauling unit.
- The rearmost warning sign is to be no more than 3 metres above ground level.
- No reflector sign other than the '**ROAD TRAIN**' warning sign, except as permitted by law shall be affixed to the front of any road train.
- The warning sign shall not obscure any light, registration plate or other safety device.
- A '**ROAD TRAIN**' warning sign shall not be displayed on any vehicle unless such vehicle is operating as a road train.

NOTE: The use of the ROAD TRAIN sign on vehicles other than road trains is prohibited.

MULTI-COMBINATION COURSE NOTES

Road Train Information

Coupling and Inspection of Trailers

- Ensure that you check with the State authority in which you intend to operate as to the requirements for coupling of trailers.
- Trailers must not vary in length more than 3 meters.
- The lightest trailer must be at the rear.
- Some may require the trailers to be tagged 1. 2. 3. And may also include an 'L' which indicates that this trailer must be at the rear.
- Always check as to whether a yearly roadworthy is required.

Speed Limits

- 2 Trailers - 90kph unless otherwise stipulated on the gazette or permit.
- 3 Trailers – 90kph the truck must be gear and speed limited.

Air Hose Connectors

- Road train vehicles are required to have *polarised* hose connectors.
- In WA it is mandatory to have *clear bore* fittings to allow air to travel the greater distance with less restrictions and achieve optimum braking.

MULTI-COMBINATION COURSE NOTES

Road Train Information

Converter Dollies

- The converter dolly towing eye is to be permanently marked to be legal.
- Length of lead between the towing eye and the pivot point of the axles on the converter dolly is: Minimum of 3 metres
MAX of 5 metres
- The towing 'A' frame must not differ more than 5 degrees from Dolly to Ringfeder.
- It is important to check the bushes at the end of 'A' frame of the converter dolly for wear and movement.
- Before coupling ensure the turntable is clean (free from sand etc).

Ringfeder

- The Ringfeder is to have a 'D' rated pin AS 2213-1984
- The Ringfeder must be 50mm diameter and this must be matched with a 50m ring. (A 40mm pin is not allowed in a 50mm eye).
- Sizing collars are no longer permissible.
- There is to be no more than 4mm wear between the ring and the pin.
- The Ringfeder must have a safety locking pin and this pin must be visible in the locked position.

MULTI-COMBINATION COURSE NOTES

Road Train Information

Converter Dollies: Brakes

When towing a trailer with a converter dolly attached only connect the supply line to release the maxi-brakes (spring brakes), do not connect the control line as this may cause the brakes to lock up, even under normal braking.

Signs

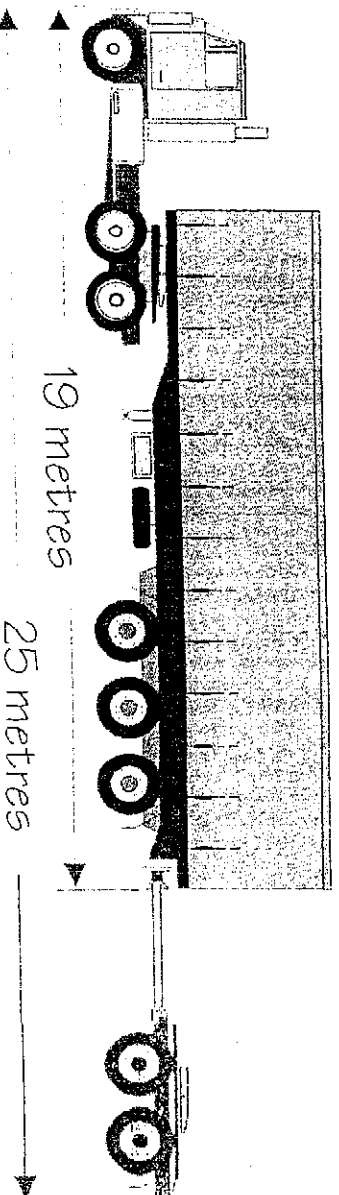
Where the vehicle overall length is more than 22 metres, the converter dolly must have a LONG VEHICLE sign fitted to the rear of the dolly.

Licence Requirements

The driver of a prime mover and semi trailer combination which tows an unladen converter dolly must hold a multi combination licence.

NOTE: the converter dolly must not carry a load.

Refer to VicRoads information Bulletin: Towing an Unladen Converter Dolly behind a Semi-Trailer.



Road Train Information

NOTE: Every effort has been made to ensure this information is accurate. Each State and Territory has different requirements, therefore you should check local requirements.

Standard Road Train Combinations

Length

2 Trailers - 36.5 metres SA, QLD, NT, WA, NSW.

3 Trailers - 53.5 metres SA, QLD, NT, WA.

Trailers must not differ more than 3 metres in length.

Trailers must not track more than 100mm either side of the hauling unit, while travelling in a straight line on a smooth level surface.

Weights

2 Trailers - 79 tonnes NSW, SA, QLD, NT, WA

2 Trailers - 115.5 tonne for all states, unless special permission is granted by a permit. (less N.S.W. and Victoria).

NOTE: Special permission is granted for vehicles outside of these conditions. eg. medium articulated dog, B-triple, AB-triple, Tri axle dollies.

Road Train Dimensions

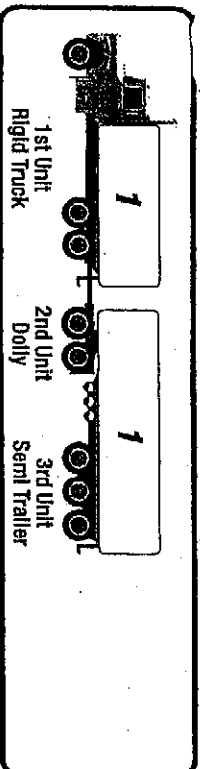
	Metres	Tonnes	Trailer Configurations
Length	36.5 53.5		2 Trailers (SA, WA, QLD, NT, NSW.) 3 Trailers (SA, WA, QLD, NT.)
Width	2.5		
Height	4.3 4.6		General, including load. Livestock, Car carriers and Hay.
Weight		79 115.5	2 Trailers (SA, WA, QLD, NT, NSW.) 3 Trailers (SA, WA, QLD, NT.)

NOTE: Double and triple trailers must not vary in length more than 3 metres.

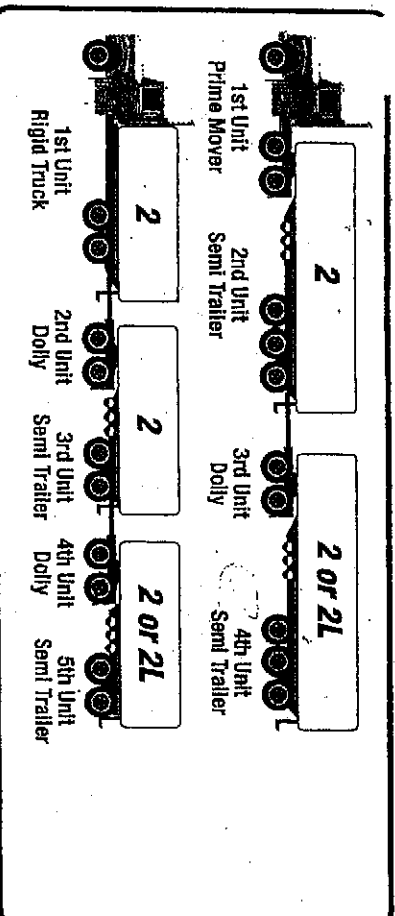
multi-combination operators
victoria / new south wales

Vehicle Ratings Chart

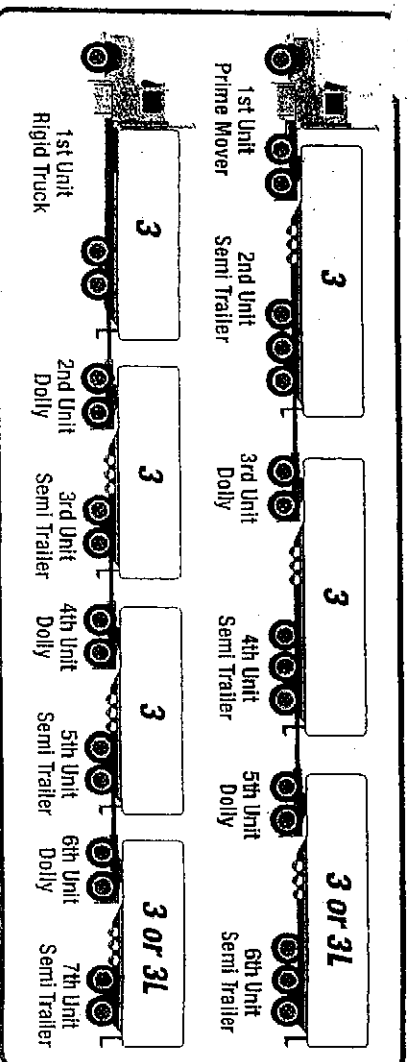
RATING 1 UP TO 64 TONNE GROSS MASS



RATING 2 UP TO 79 TONNE GROSS MASS DOUBLE



RATING 3 UP TO 115.5 TONNE GROSS MASS TRIPLE



Road Train Retention Questionnaire: _____

1. Road train trailers must not vary more thanmetres in length.
2. What is the maximum angle a drawbar must not exceed?
3. What diameter RINGFEEDER pin and ring should be used?
Answer:
4. What is the maximum speed for a three trailer road train, operating in South Australia?
Answer:kph
5. If you are operating a road train in South Australia, during the day, what must be turned on?
6. Trailers must not track more than either side of the hauling unit, while travelling in a straight line on a level, smooth surface.

B – Double Retention Questionnaire:

1. What is the maximum weight allowable on a green gazetted road, for a 25m B-Double without the need to obtain a permit?
 - a. 42.5 tonne
 - b. 62.5 tonne
 - c. 49.5 tonne
2. In Victoria, a B-Double must be able to start from a rest position on what grade?
 - a. 10% grade
 - b. 12% grade
 - c. 15% grade
3. What is the maximum allowable speed for a B-Double?
Answer:kph
4. What type of hose connectors must be on a B-Double?
Answer:
5. On the open road (outside a built up area), what is the following distance for a B-Double behind a vehicle 21 metres long?
Answer:
6. What is the maximum length of a B-Double in Victoria without a permit?
 - A. 23 metres
 - b. 25 metres
 - c. 26 metres
7. A long vehicle sign must be fitted to a B-Double over what length?
 - a. 19 metres
 - b. 22 metres
 - c. 25 metres
8. Spray suppression must be fitted to?
 - a. all axle groups
 - b. prime mover
 - c. just the trailers
9. What is the maximum height of a B-Double carrying a 2.9 metre container?
 - a. 4.1 metres
 - b. 4.3 metres
 - c. 4.6 metres
10. What is the maximum height of the "Long Vehicle" sign on the rear of a B-Double?
 - a. 3 metres
 - b. 2.5 metres
 - c. 1.8 metres